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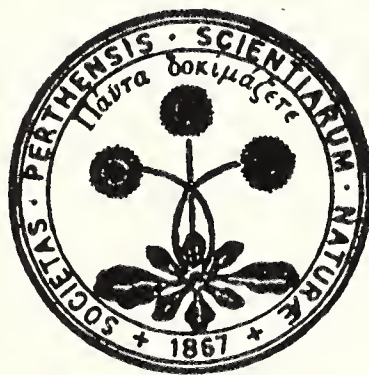
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JOURNAL OF THE PERTSHIRE SOCIETY OF NATURAL SCIENCE



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Contents

Kenneth M. MacAlpine

Treasurer of the Society 1944-1990

Methven Castle

K. L. S. Murdoch

The Status of Autumn Passage and Winter Populations on the Inner Tay Estuary

Sylvia A. Laing and N. W. Taylor

Pitmiddle Village and Elcho Nunnery Five Testaments

Marion L. Stavert and D. R. Perry

Yukon 1990 Expedition Report

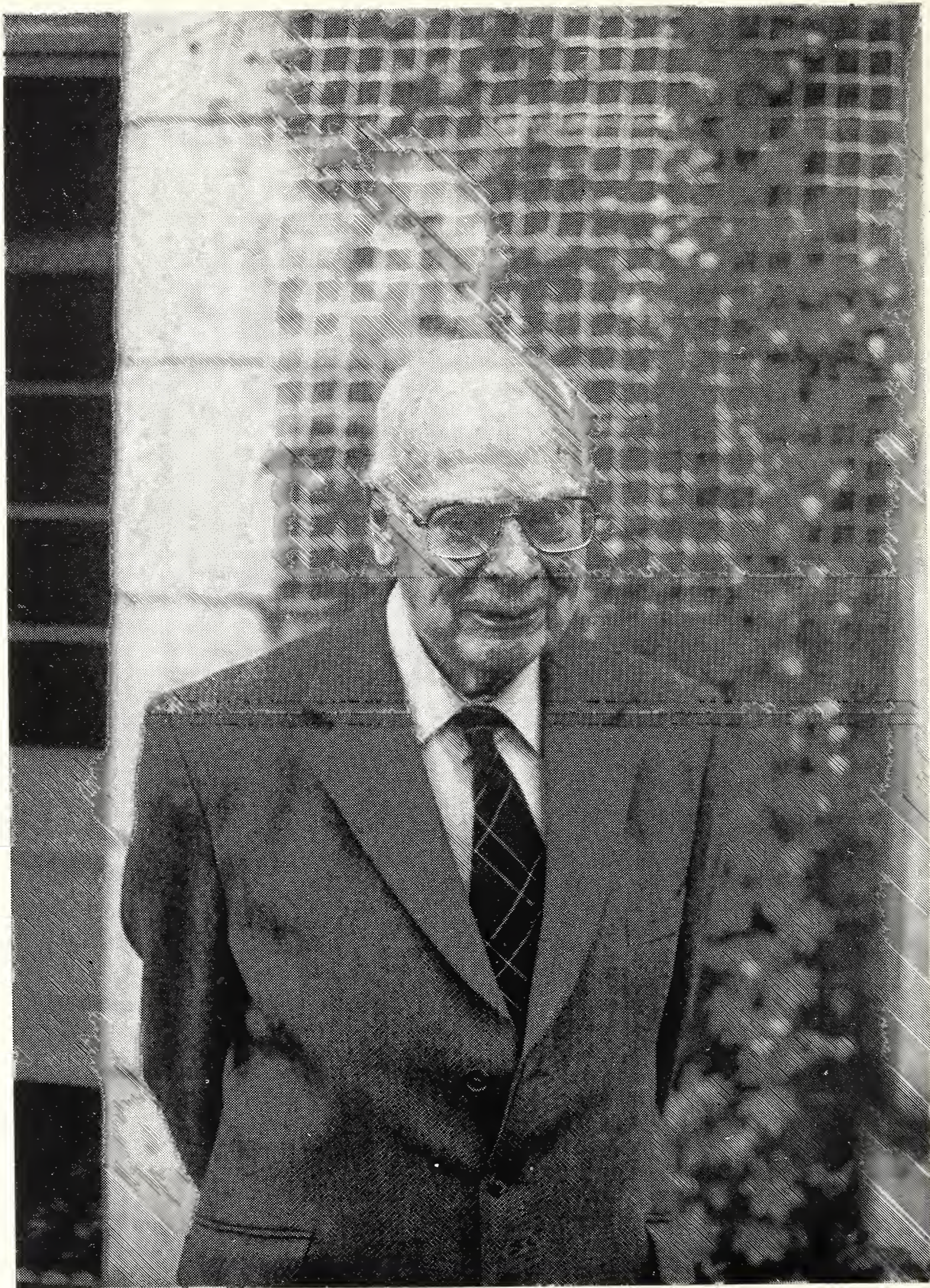
A. Sandeman

The Floods in Perthshire — February 1990

R. Allcock

Cover:

Methven Castle — early 18th Century pen and ink drawing



Kenneth M. MacAlpine. *Photo J. Kirk.*

Kenneth M. MacAlpine

Kenneth MacAlpine became a member of the Society in 1935, having an interest in all aspects of Natural Science and a desire to meet others with similar interests. His main studies were Geology and Ornithology but Botany and the whole of the vegetable kingdom received his keen attention.

While taking part in various Society outings he observed everything around him in the sky, the geography of the land and even the way a herd of cattle grazed over a field.

After serving on the Council for a number of years, much to his surprise he was appointed Hon. Treasurer of the Society in 1944, a position he held with distinction until his retiral in 1990.

During these many years in office he became much loved and respected, not only by members of the Society but all who knew him in Perth and beyond.

In 1985 the Society recognised his long period of service by conferring on him an Honorary Membership.

Kenneth has travelled the length and breadth of Scotland and this he has recorded with a large collection of colour slides.

It is with sincere appreciation from his many friends and acquaintances that we wish him and his wife Rita many more years to enjoy their peaceful pursuits.

Methven Castle

K. L. S. Murdoch



Methven Castle from the south-west 1990 *Photo: Louis Flood, Perth.*

Methven Castle stands on a ridge four miles to the West of Perth. Clearly defined against a background of tree and hill and visible across the rich Strathearn farm land, it marks ten thousand years of colourful Scottish history. This alone would be sufficient to give it special recognition but its superb architectural qualities emphasise the significance of its Cat. A listing.

An early reference is not to the Castle but to Radhard, Thane of Methven, who may have lived at Culdeesland to the West of the present building. King Culen of the Scots was crowned in 972A.D. when three years later, because of immoral living Culen was summoned to appear before Parliament in "Skoyne". Radhard, the Thane, slew the King "to the great joy of many and the grief of very few".

Roger de Mowbray of Normandy came to Britain with William the Conqueror and one of his descendants Philip de Mowbray obtained a grant of the Barony of Methven in 1166. Later, in the Wars of Independence Robert de Mowbray supported the Balliol faction and following the defeat of the English at Bannockburn in 1314, lands and property were confiscated by the victor, Robert the Bruce. Methven was then given to Bruce's daughter Marjory who married Walter, 8th Hereditary High Steward of Scotland. Their son Robert II became the first of the Stewart Dynasty.

In 1427 Methven Castle fell to the crown following its forfeiture from Walter, Earl of Atholl. He had been implicated in the plot to murder James I at Blackfriars in Perth and subsequently lost not only the castle but also his life. In 1444 it is recorded that Methven Castle was besieged and captured while occupied by Sir William Crichton. During 1450-51 King James II and his Queen were in residence at Methven.

Extracts from the Lord High Treasurer's accounts tell us something about King James IV when at Methven.

1492 Payment for Estland Burchis for wyndokes and durris at Meffane

1496 To the King to play at the table £4.13s

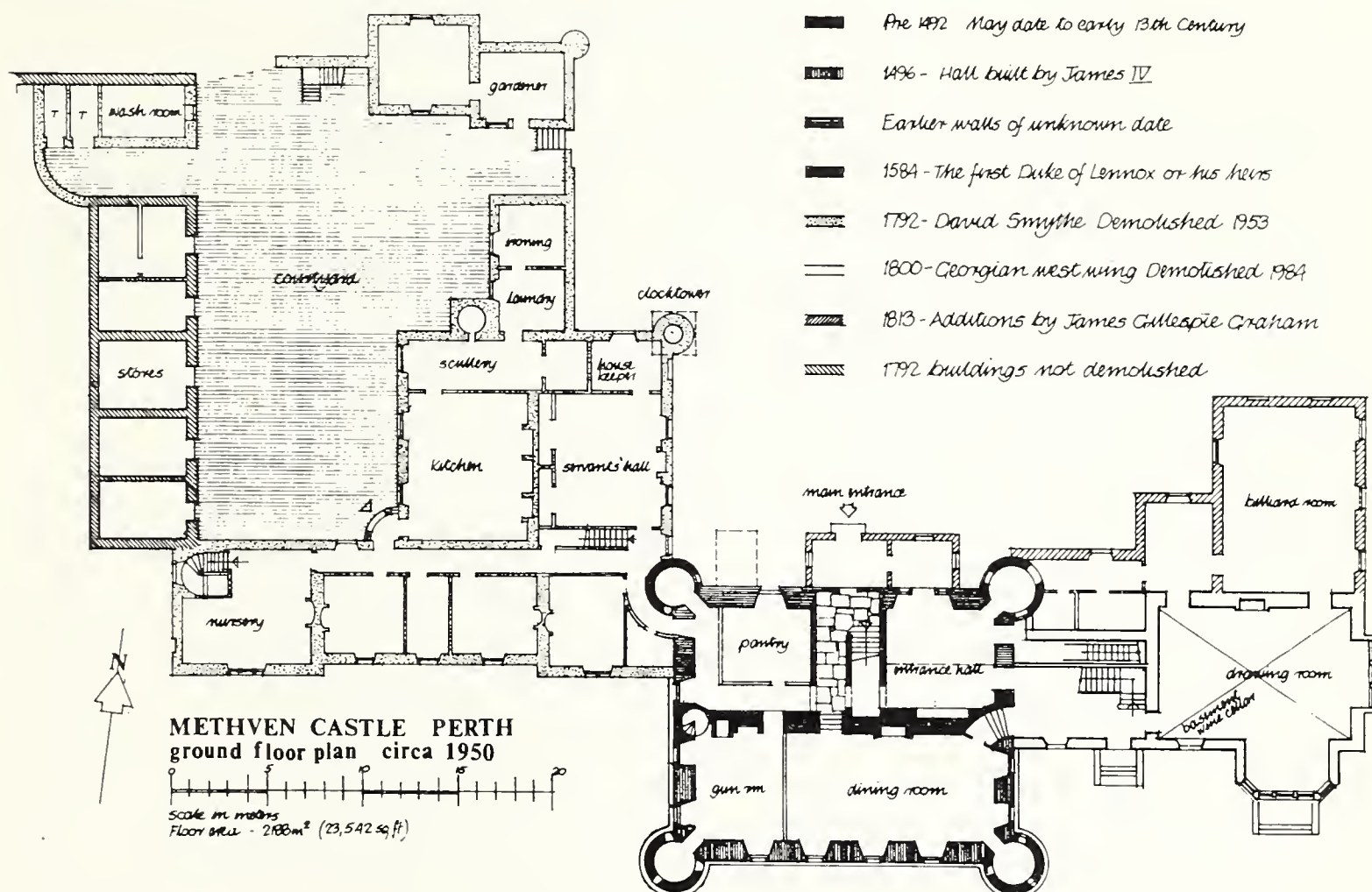
Giffen to the portare at Meffane 16d

To the cuke and panetare in Meffane 14s

1497 The third day of Jany giffen to the Provost of Meffane to byg the hal of Meffane with £9

In Meffane, 24th August, giffen to a pure wif at the King's command 5s 6d

In the time of James IV and V day to day survival was a full time job leaving little opportunity to pursue other interests. The hard Scottish climate and the need to have protection against attack was the catalyst to the practical art of architecture. James IV was "given to Buildings and trimming up of Chappels, Halls and Gardens". His building exploits are well recorded and include the castles at Inverness, Tarbert and at Methven where "a new hall or palace was added to the old towers in 1496.



Other than the centre spine wall of the castle against which the James IV hall was built there is no clear indication of earlier building. This wall has interesting features. On the West there is a turnpike stair. This is built into the wall thickness

and may have been the entrance to the upper floors of an earlier building. There is a small window opening confirming that the wall was once external. The large arched stone fireplace, the guardrobes at upper floors with remnants of a duct to ground level, the safe arches over stone lintels, the mason's marks, the various niches and the oyster shell wedging indicate age.

James IV married Margaret Tudor, sister of Henry VIII in 1503. Queen Margaret was not yet fourteen and her husband was 35 years. In nine years of marriage she had 6 children. James V was the only survivor. Margaret married Archibald Douglas, 6th Earl of the Douglas house of Angus at the old Church of Kinnoull in 1514 after the death of James IV at Flodden field in 1513.

1503

*James IV m. Margaret Tudor
(Union of the Thistle to the Rose)*

1538

James V m. Mary of Guise

1565

*Mary Stewart m. Henry Stewart
(Mary Queen of Scots) (Lord Darnley)*

James VI

1514

*m. Archie Douglas
6th Earl of Angus*

1544

*Margaret Douglas m. Matthew Stewart
4th Earl of Lennox*

The importance of Margaret Tudor in Scottish history is emphasised by the fact that she was the grandmother to both the mother and father of James VI.

Margaret Tudor's third marriage was to Henry Stewart. Her son James V gave them a charter to the Lordship and Barony of Methven and Balquhiddar. This charter is written with a flourish of calligraphy on parchment. The wax seal of the King is still firmly attached. Recently translated from the original Latin the description is of great interest and a unique document, dated 17th July 1528. It is a title from a royal to a royal. An abbreviation of the text reads—

“James by the grace of God, king of Scots, to all good men of his whole land, cleric and lay . . . have given, granted heritable and by this our present charter confirmed to our dearest mother Margaret Queen of Scotland and Henry Stewart her husband . . . for the wordly and favour which we have and bear towards our foresaid dearest mother and for the good faith and acceptable service rendered and to be rendered to us by the foresaid Henry brother german of our cousin Andrew, Lord Allendale, and for the exaltation of our honour All and Whole our lands and lordship of Methven with castle, mills, fishings, forests, holdings tenures avowsons and presentations to a provostship of prebends and their chaplaincies . . . and the services of their freeholders and its pertinents lying within our sheriffdom of Perth we unite, bind create and incorporate into a free lordship and barony for all time coming to be called the lordship and barony of Methven ordaining that the foresaid castle of Methven be the principal house of the said barony . . . for ever by all their right, ancient and devised meaths as they lie in length and breadth in woods, plains, moors,

marshes, ways, paths, waters, pools, streams, meadows, grazings and pastures, mills, multures and their sequels hawkings, huntings, fishings, petaries, turbaries, coal-heuchs, quarries, stone and lime, smithies, brew-houses, heaths and brooms, with courts and their issues, herezelds, bloodwits and marckets of women with gallows, ordeal-pit sok, sac, tholl, theme, infangthief, outfangthief, pit and gallows, with common pasture, free entry and exit and with all and sundry their other liberties, commodities, profits, easements and juet pertinents whatsoever . . .”

It is unfortunate there is not more information available about Methven Castle “principal house of the barony” at the time when the charter was signed 448 years ago.

Queen Margaret died at Methven Castle in 1542. She was interred with great pomp in the Carthusian Monastery at Perth, beside the tomb of James I. Her tomb, and those of other royal personages were afterwards removed to St John’s Church, Perth.

The lordship of Methven continued in the possession of this branch of the Stewarts but the third Lord had no heir and the title became extinct in 1584. The Lordship was thereafter conferred by James VI on the Duke of Lennox — “a boundless favourite” of both James V and VI. In 1594 a riot took place at the Castle when a man called Farquharson was killed. At a court hearing in Perth to judge the case against William Gray of Lyndoch, burgesses who were summoned on jury duty objected to appear because the crime was committed outside the burgh. In 1664 Patrick Smythe of Braco purchased Castle and estate. Ownership remained with the Smythe family for 257 years.

Alteration work on a castle tower exposed a stone with elegant carved initials 55mm high of Patrick Smyth and Ann Keith.

Ann Keith was a formidable lady who drove a party of Covenanters from the castle grounds in October 1678. In a letter to her husband she writes—

“My precious love, a multitude of men and women from east, west and south came, the 13th day of this October to hold a field-coventide, two bows draught about our church. They had their tent set up before the sun, upon your ground. I, seeing them flocking to it, sent through your ground and charged them to repair to your brother David, the baillie and me, to the castle-hill where we had sixty armed. Your brother with drawn sword and bent pistol I with the light horsemen’s piece bent on my left arm, and a drawn tuck in my right hand, all your servants well armed marched forward and kept the one half of them franting with the other that were guarding their minister and their tent which is their standard. We told them if they would not go from the parish of Methven presently it would be a bloody day for I protested as also your brother before God, that we would wear our lives upon them before they should preach in our regality. We charged them to fight or fly . . .”

In the 18th and 19th centuries castle owners carried out many alterations and extensions. These were built in the style of the time and Methven Castle was one of many examples where there was little attempt to pick up the character of earlier building. In time these buildings have become listed leaving a legacy of fine buildings.



Methven Castle from the east. (19th Cent.)

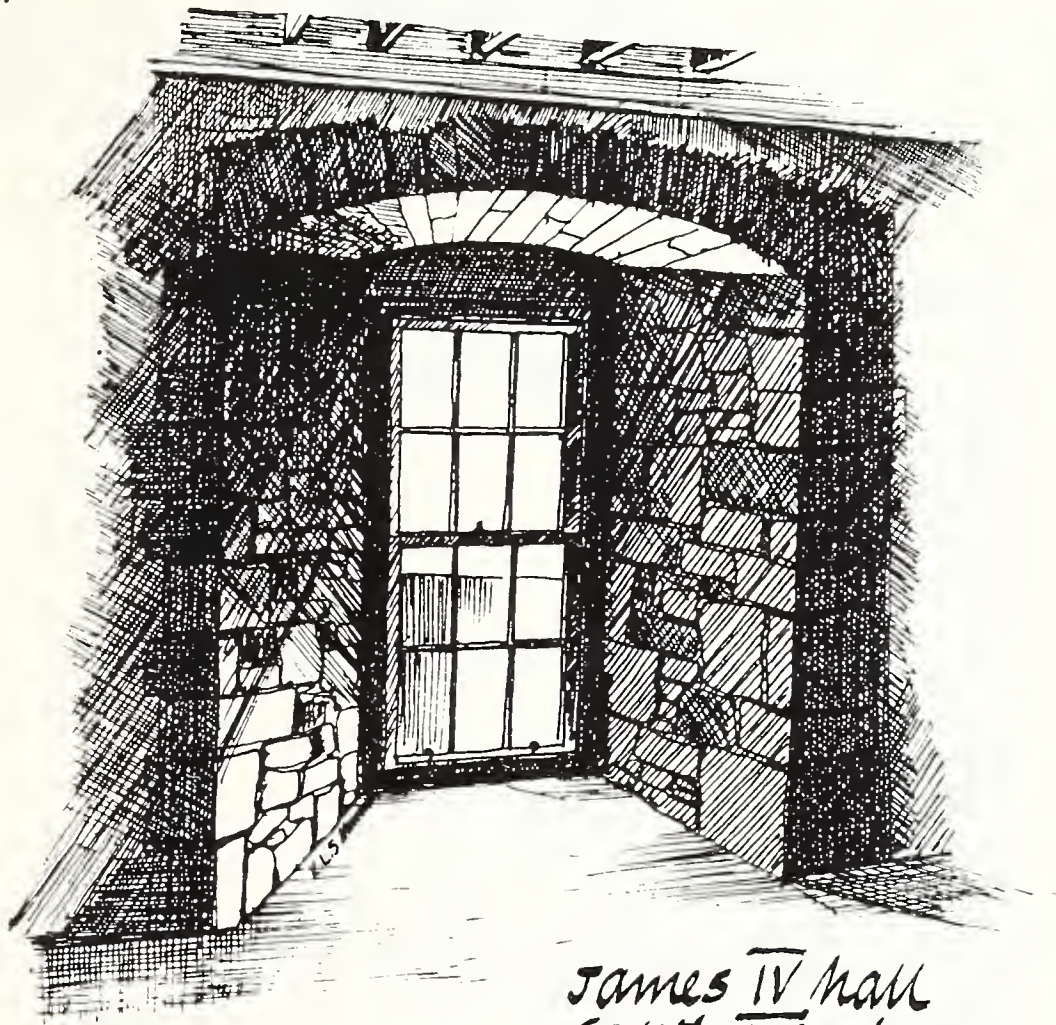
James Gillespie Graham, the fashionable architect, prepared proposals for a new entrance hall. Fortunately this romantic asymmetrical Gothic building was not built since the plans show the earlier south west tower rebuilt as a square tower and finished with Gothic exenellations.

Some alterations did take place with the addition of a billiard room and some time later, two bay windows were added. A drawn record of the castle plan was prepared at the time and this has been an invaluable record. The 19th Cent photograph portrays an elegant assembly of buildings surrounded by fine planting. The following was published about the same date as the photograph—“The present laird, Mr William Smythe, the respected Convener of the County, has improved the castle very considerably covering it with a new roof and modernising it in several respects. He has also increased the amenity of the ancient edifice by enlarging the grounds to four times what they were when he came into possession, planting a large number of valuable trees and building an extensive range of glass erections in the gardens adjoining”. Particular mention is made of fine specimens of *Wellingtonia gigantea* planted from seeds sent by a Californian friend. The tree boles remain in the wood to the west. Trees were cut for no apparent reason, about 40 years ago. The celebrated Pepperwell oak still stands; although damaged over the years it has a well recorded history. In the New Statistical account of the Parish it is described as “a tree of great picturesque beauty and contains 700 cub ft of wood; the trunk measures 17½ft in circumference — an increase of three feet since the year 1796”. In 1867 it was measured 5'0" from the ground at a girth of 23ft. The tree was “known to be 400 years old” in 1880.

Methven was purchased by James Ernest Cox in 1923. From 1954 when it was again sold the building deteriorated substantially. Recent restoration work which started in 1984 commenced with the removal of a dry rot infected interior. Although there was interesting Georgian plasterwork this was interspersed with crude alterations dating to the 1950's. In the end all was removed including most of the roof, revealing a building as it would have been in the 17th Century.

The window openings to the James IV hall had been doubled in height to Georgian proportions and in most cases earlier windows have been altered in the same way. It was fortunate this work had been carried out before the time when Historic Buildings and Monuments were able to exert control. The enlarged windows to Georgian dimensions are significant factors contributing to the quality of light. Listed building consent was granted for the demolition of the east wing in 1984. Before this work commenced the Georgian 6 panel pitch pine doors, architraves and window shutters were removed, restored and re-used.

In the James IV hall at ground floor level, walls have been left in stone. Arched windows and robust stonewalls add to the pleasure of looking out and beyond to the Lomonds.



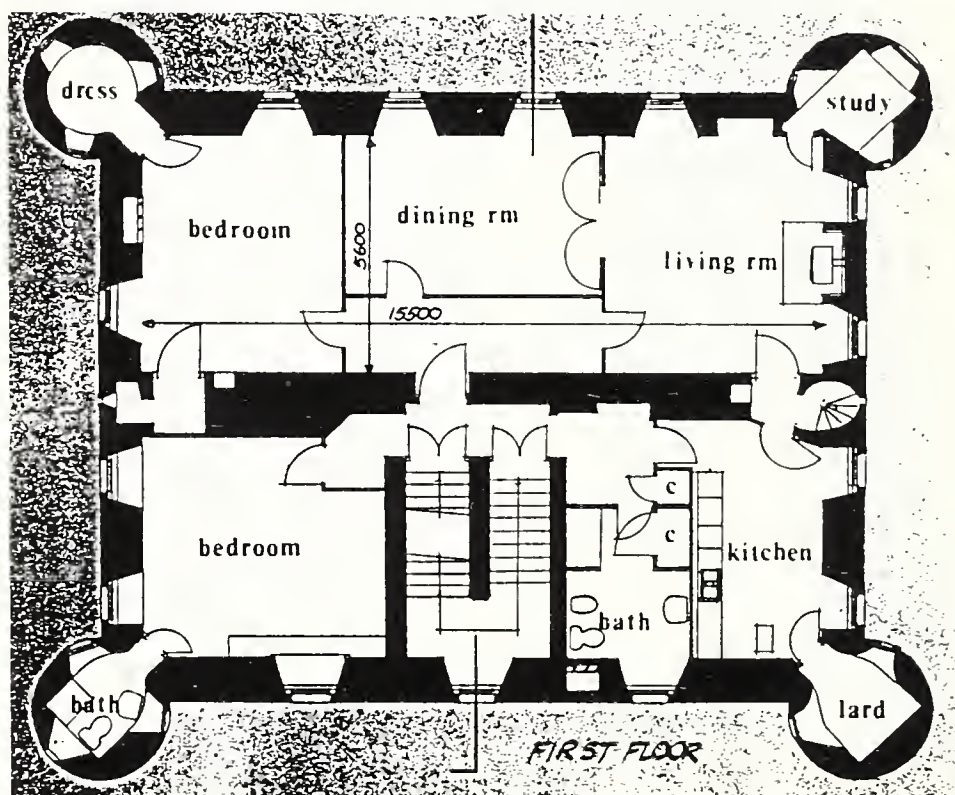
*James IV Hall
South Window*

Many materials required for the reconstruction have been scavenged from demolished buildings. Redwood joists from Huntingtower Bleach Works and Dewar's Bonded Warehouse, maple flooring from a flax factory and yellow pine church pews from an abandoned church have each in their own way implanted an "age factor" thereby retaining some of the character we associate with old buildings. Roof timbers are new but of a size similar to the original adzed trees used for rafters. Many of the 600+ panes of glass were cut from windows following their replacement by double glazing.

The date of the present castle has not been positively established. At ground and first floor the circular corner towers show clearly that they have been spliced onto older walls. A tree root embedded into an internal wall at first floor ceiling level on the S.E. corner suggests that it had taken a firm hold before towers were added. The stone work at the second and third floors ties into towers indicating that upper walls and towers were built at the same time. Ground floor windows have stone arches and apart from the first floor windows to the north side, the remaining openings are spanned with oak lintels.

It is recorded that the architect, or master mason for Methven Castle was John Mylne. The first of this name practised his craft in the reigns of James III and IV (1460-1513). John Mylne was established in Dundee during the last decade of the 16th Century. He and his father successively held the post of King's Master Mason. In 1580 he was engaged in various works at Dundee including in 1586 the market cross. His son John Mylne (1611-1667) was born in Perth and succeeded his father as Master Mason to the Crown. From 1584 during the ownership of the Duke of Lennox, a Stewart related to both James V and VI, it is more than likely that John Mylne was asked to carry out work for the re-building of the Castle.

The north elevation survey shows the outline of the now demolished east wing built in 1803. Superimposed on the original castle is a square, centred on the circular corner towers. Were these proportions used in the preparation of the design?



A spacious flat at first floor was completed in 1986 to provide a comfortable centrally heated home. The ground floor with workshop and utility room provides an important backup to the continuing restoration in the upper floors and below ground there is a tunnel which has been sealed off until time can be found to carry out further investigation.



ACKNOWLEDGEMENTS

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The status of autumn passage and winter wader populations on the Inner Tay Estuary, 1971 to 1989

Sylvia A. Laing and N. W. Taylor

Introduction

Britain supports internationally important populations of wintering and migrating wading birds. Since 1970, the Birds of Estuaries Enquiry (BOEE), organised by the British Trust for Ornithology, has sought to determine the distribution and abundance of these populations, particularly during the winter months (Prater, 1981).

The Tay Estuary is not amongst the first rank of British estuaries compared, for example, to the Wash, the Solway, or the Severn, but nonetheless supports significant numbers of waders as well as ducks and wildfowl, and counts have been undertaken on the Tay Estuary since 1970.

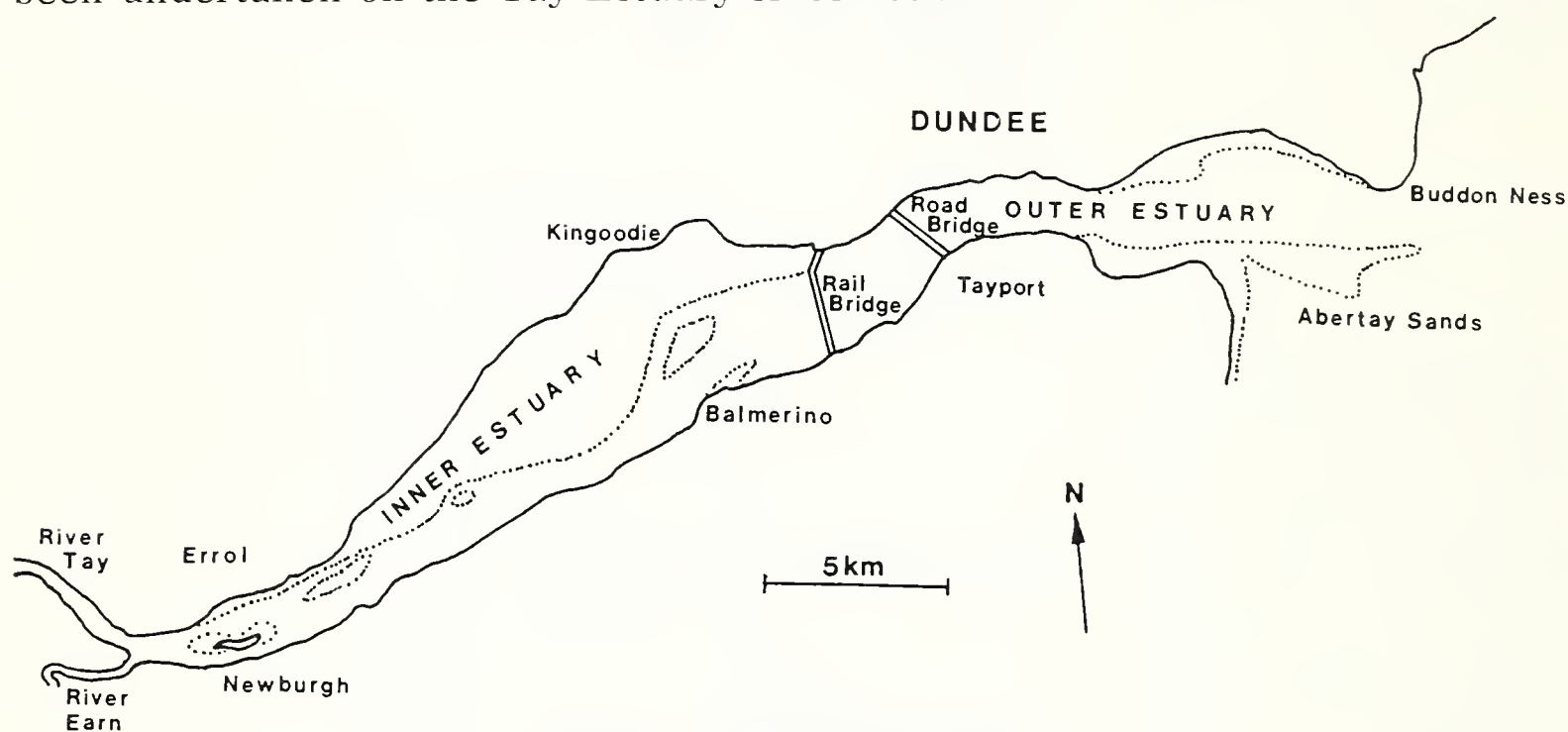


Figure 1. The Tay Estuary.

The Estuary can be conveniently divided into two sections, namely the Inner and Outer Estuary, the two sections separated by the road and rail bridges (Figure 1). The movement of waders between the Inner and Outer Estuaries appears to be slight, except perhaps for Bar-tailed Godwits, and therefore it is convenient to treat the two areas as two separate units. The purpose of this paper is to describe and discuss (a) the BOEE counts since 1971 on the Inner Estuary and (b) a special low water count in January 1989.

The Inner Estuary

The Inner Estuary (3 W, 56 N) between the rail bridge and the confluence of the Rivers Earn and Tay extends to approximately 6700ha. The Estuary is tidal as far

upstream as Perth although saline influence does not usually extend upstream of Newburgh (Williams & West 1975). The substrates in the intertidal zone are described by Khayrallah and Jones (1975) as follows:

“The north shore of the inner estuary (Errol eastwards to Invergowrie) is dominated by sand and mud flats bounded at high-water mark by narrow salt flats and *Phragmites* (reed) marsh. The flats consist primarily of sand or muddy sand with a band of soft mud just below high water mark . . . The south shore is very variable in composition, being an admixture of mud, sand, pebbles and bedrock. The shores near Newburgh consist mainly of a mixture of mud and gravel . . . although some sandbanks are to be found.”

The nature of the sediments reflects the tidal currents within the Inner Estuary: where they are strong, coarse sands and gravels predominate; where they are weak, there are muds and fine sands.

The diversity of marine invertebrates is comparatively low in the Inner Estuary, declining rapidly above Invergowrie. This is due in part to the overall decline in salinity, but also to the extremely large variations in salinity which can occur within each tidal cycle in this part of the Estuary. The density of invertebrates is greatest in the muds and fine sands (Khayrallah and Jones, 1975).

The Tay Estuary is one of the cleanest in Britain, but there are a number of outfalls discharging raw sewage. In particular, the outfall at Invergowrie discharges untreated sewage providing a plentiful source of organic material for mud invertebrates (A. Jones *pers. comm.*).

Much of the Estuary below the confluence of the Earn and the Tay has been designated as a Site of Special Scientific Interest by the Nature Conservancy Council, and has been recognised as being of international importance having been accorded Grade 1 status in the Nature Conservation Review (Ratcliffe, 1977) because of the internationally important roosts of Greylag *Anser anser* and Pink-footed geese *A. brachyrhynchus*. The reed beds on the north and south shores with a total area of 400ha are believed to be among the largest in Britain (Ratcliffe, 1977).

Wader Counts

a. High Tide Counts

BOEE counts are usually conducted once a month between September and March at high tide when all the birds are concentrated into roosting areas. If possible, counts are carried out at spring (ie. the highest) tides on or as near as possible to the middle weekend of the month. Counts are started two hours before high water and continue until high water.

On the Inner Estuary, as the tide rises, it is believed that most of the birds from further down the Estuary are forced onto the mudflats near Kingoodie and in Invergowrie Bay (Figure 2). Birds are also forced up the shore onto these mudflats. Curlews then tend to gather on a breakwater at Burnside of Monorgan before flying off inland to roost on agricultural land in the Dundee area. Any Bar-tailed Godwits on the Inner Estuary also use the breakwater apparently before flying to the south side of the Outer Estuary to roost. They are the only

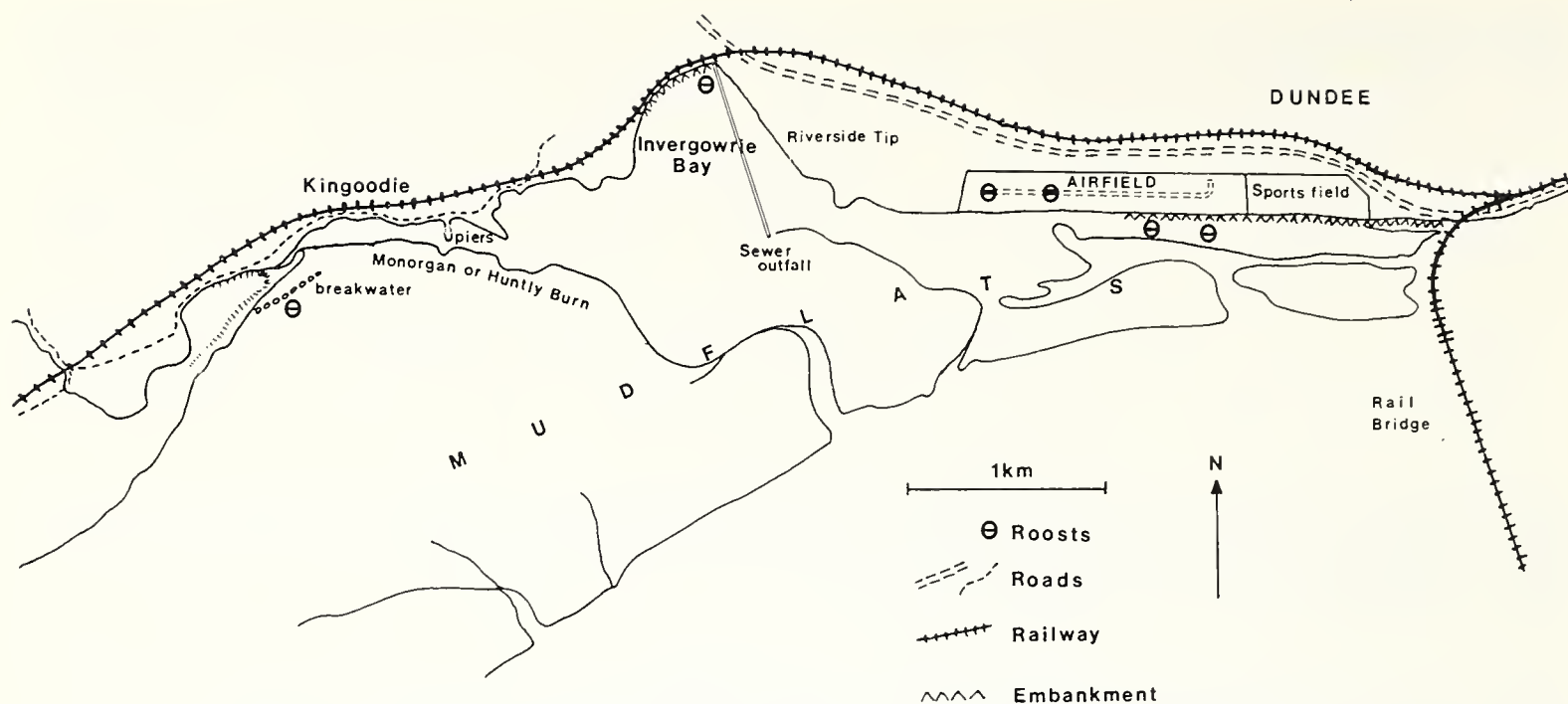


Figure 2. The main wader roosting areas on the Inner Estuary.

species thought to move between the Inner and Outer Estuary within each tidal cycle, at least during spring tides, although it is not known where birds feeding near Wormit on the south shore go to roost.

As more of the mudflats are flooded, the remaining waders move eastwards beyond Kingoodie Pier. Invergowrie Bay is the last area to be covered by the tide, and it is here that Lapwing and Golden Plover tend to congregate before flying inland. Dundee Airfield holds the main roosts of Oystercatcher, Redshank and Dunlin, small numbers of Lapwing and occasionally Curlew and Ringed Plover; Oystercatchers, Redshank and Dunlin often roost on the seawall embankment, especially if the grass on the airfield is kept long. If the tide is not sufficiently high, large numbers of Dunlin and Redshank may remain in Invergowrie Bay on the seawall embankment adjacent to the railway line. Redshank may occasionally roost on Riverside Tip. The Airfield has only been open since the 1970's, but has only been properly counted since the mid-1980's when access permission was obtained from the Airfield Authorities, there being no public access.

Although it is believed that most waders can be counted at some stage in the Kingoodie and Invergowrie area, it is known that roosts of Golden plover, Curlew and Lapwing can develop virtually anywhere on arable land adjacent to the Estuary. Given the difficulties of locating these roosts along some 40km of Estuary shore-line, there seems little doubt that these species are under-counted.

High tide counts have been undertaken on the Estuary since August 1969, but in some years few counts have been done (see Table 2). The locations of regular roost sites are shown on Figure 2.

b. The Low Water Count

A special count was made during a low water neap tide on 29 January 1989 to locate the main feeding areas of birds in the Inner Estuary. The Estuary below Port Allen was divided into 14 sections (Figure 3). Observers were positioned at a suitable vantage point in each section, and a count was made at low water. It is

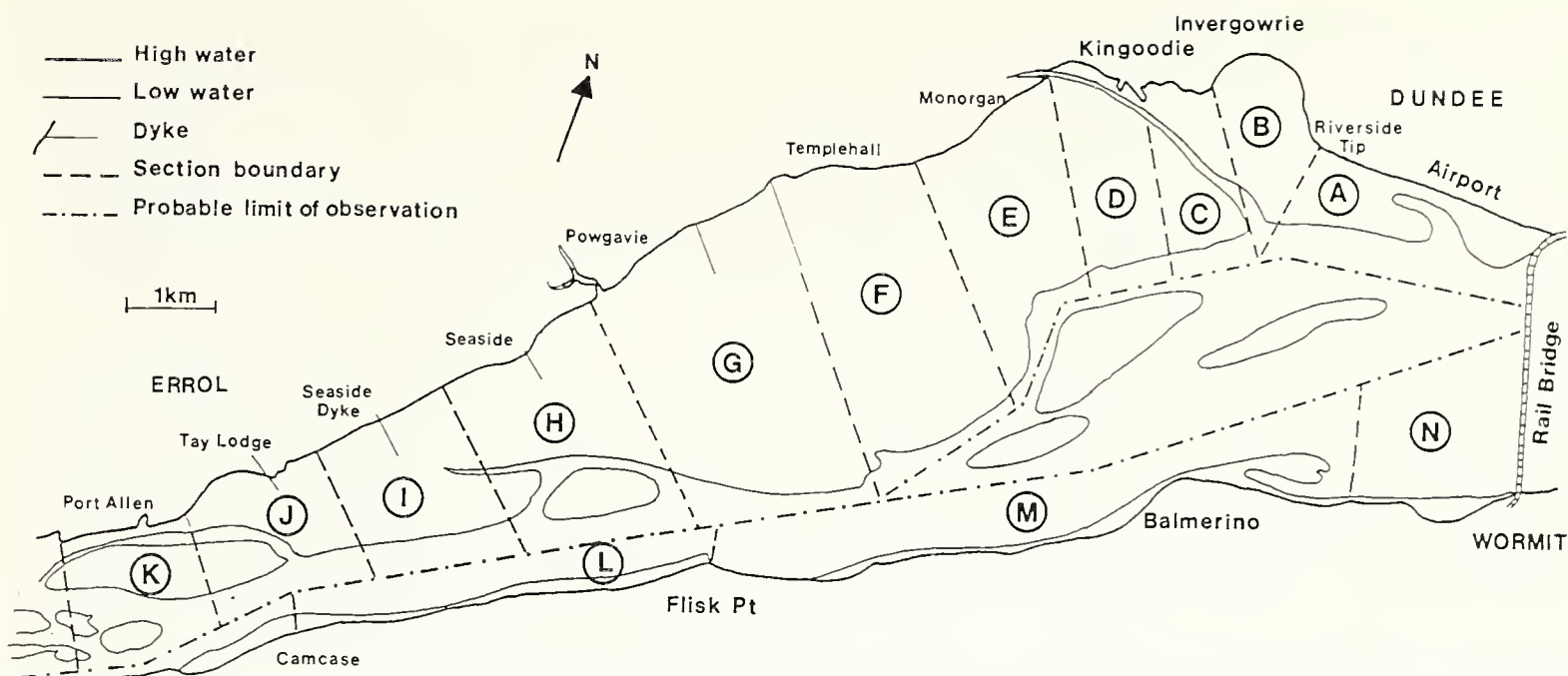


Figure 3. The sections used for counting for the low water count on 29 January 1989 (results in Table 2).

likely that some errors in counting and species identification were made, especially in sections B to G when birds may have been feeding up to 3km from the observers.

Results and discussion

Table 1 and Figure 4 summarise the winter and autumn passage counts since 1971 for the main wader species for those seasons when there were at least three winter counts, and when passage counts were undertaken in both September and October. For example, for each winter season (eg. November to March) the maximum count for each species has been determined, and then an average of these maxima calculated for each period (eg. November 1971/72 to March 1974/75). For autumn passage counts, maxima in September and October have been used to calculate the averages.

The main waders using the Inner Estuary both during autumn passage (September and October) and in winter (November to March) are Curlew *Numenius arquata*, Lapwing *Vanellus vanellus*, Golden Plover *Pluvialis apricaria*, Oystercatcher *Haematopus ostralegus*, Redshank *Tringa totanus*, Dunlin *Calidris alpina* and Bar-tailed Godwit *Limosa lapponica* with Ringed Plover *Charadrius hiaticula* in small numbers. Species such as Curlew Sandpiper *Calidris ferruginea*, Greenshank *Tringa nebularia*, Ruff *Philomachus pugnax* and a few Little Stints *Calidris minuta* may also use the Estuary during spring and autumn migration, but their numbers are insignificant. Sanderling *Calidris alba*, Knot *C. canuta* and Grey Plover *Pluvialis squatarola* which occur on the Outer Estuary are very rarely found above the bridges.

Changes in wader numbers since 1971

Variations in numbers of waders using a given estuary between years is dependent on a number of variable factors, the most important of which are probably (a) the national population size and (b) the weather. Estimates of national population size for each species are difficult to obtain every year

because BOEE national count coverage also varies between years. To overcome this, an *Index* of wintering numbers is calculated for each species (eg. Salmon and Moser, 1985). This is done by comparing the total national January counts from the same localities every year to an 'anchor' year, which has been arbitrarily chosen as the 1973 January count. Each species was given an Index of 100 in this year, so that if, say, the January count in 1974 showed a 20% increase in numbers, the Index would be 120.

In periods of hard weather (especially during severe frosts) birds may move between estuaries, and because of differences in weather between years, comparisons between individual years may not show real changes in population sizes, but over a longer term, changes in Indices *should* indicate real changes, provided there are no significant permanent changes in weather patterns. For this reason, in Table 2, *average* Indices have been calculated for each period.

Indices are not calculated for Golden Plover and Lapwing because during severe winter weather, large numbers of these two species may move from frozen or snow-bound farmland to estuaries; national population trends are therefore difficult to elucidate (Salmon *et al* 1989).

Changes in wader numbers wintering on the Inner Estuary in comparison to the national indices of wintering numbers over three periods since 1971, are shown in Table 2 and Figure 4. Autumn passage numbers during the same periods are also given. From these data the following broad trends can be identified:

Winter Oystercatcher numbers have increased significantly both nationally and locally since 1971, but numbers on the Inner Estuary have increased 5-fold, while the national wintering population has less than doubled; autumn passage numbers on the Inner Estuary have increased more than 4-fold.

Curlew numbers wintering on the Inner Tay have increased although nationally numbers are lower; passage numbers on the Inner Estuary however have declined.

Bar-tailed Godwit numbers on the Inner Tay have dropped dramatically since the 1970's, showing a 70% fall, although the national population Index has increased by 60%.

Redshank numbers closely follow the national indices, both showing a similar decline then rise. Autumn passage numbers have shown similar fluctuations.

Dunlin passage counts have declined since the early 1970's, however the average passage count for the early 70's has been greatly inflated by an exceptionally high count of 10,000 birds in October 1973. As for Redshank, winter numbers have closely followed changes in national numbers.

Golden Plover numbers, especially in winter, have decreased. Lapwing passage numbers increased in the early 1980's but have since declined, while winter numbers have remained more or less steady. For the same reasons that Indices are not calculated for these species, it is difficult to know how significant these changes are.

The decline in Bar-tailed Godwit numbers is of most concern, especially as it is the least common nationally of the main wader species, although this is to some

extent compensated by increases in other species, in particular Oystercatcher. There are no obvious reasons for this decline. It may be that the infilling of Invergowrie Bay with refuse, and the consequent loss of or changes in feeding habitat and/or roosting areas may have been responsible.

Following the opening of Dundee Airfield, the prevention of access along the foreshore, and consequent lack of disturbance could have created further safe roosting areas particularly for Oystercatcher, which have greatly increased in numbers on the Inner Estuary, and perhaps to a lesser extent Redshank and Dunlin.

The Result of the Low Water Count

The low water count revealed that most of the waders were to be found feeding in the Invergowrie Bay to Powgavie areas (Table 2 and Figure 3). The concentration of birds in Invergowrie Bay and the seaward end of the Monorgan Burn could be caused mainly by the rich feeding around the Invergowrie sewage outfall which deposits organic material onto the mudflats, as well as the Monorgan Burn bringing in some organic material.

Given the large expanses of foreshore exposed at low tides in the Inner Estuary above Powgavie there were surprisingly few waders here other than small numbers of Redshank, Curlew, Golden Plover, Ringed Plover and Lapwing. This may be a result of limited availability of appropriate invertebrate food (see above). Dunlin and greater numbers of Redshank may use the upper Estuary occasionally (B. Lynch *pers. comm.*). Golden Plover was the only species found in larger numbers above Seaside than below Powgavie.

The only area with waders on the south shore was near Wormit; elsewhere there are only limited areas of mud and fine sand on this side of the Estuary, and there is presumably limited available food.

Despite only one low water count having been made, it is thought that it is a reasonable reflection of the distribution of waders under most conditions, although this could only be confirmed by further low water counts. Only one of the main species, Bar-tailed Godwit, was not located, and the numbers of the other species obtained were not atypical given the likely counting errors. A high water count was not possible on the same day to confirm overall numbers and to give an estimate of counting errors because as is usual in the winter, the hours of daylight were all too few.

The Importance of the Inner Estuary

One criterion used for assessing the importance of a given area for birds is whether or not more than 1% of a national or international wintering, breeding or passage population regularly occurs (eg. Fuller & Langslow, 1986). Table 3 gives the 1% qualifying levels for each of the main wader species on the Inner Estuary.

A comparison of these levels with the average maximum counts for seasons 1985/86 to 88/89 given in Table 1, reveals that only Redshank occurs in nationally important numbers, both during autumn passage and winter, but no species occur in internationally important numbers. Of the other species, only Dunlin approaches national importance, and during autumn passage only.

The Future

Many of Britain's estuaries are currently under threat from developments such as yachting marinas, barrages, oil pollution, nuclear power stations, and waste disposal (eg. RSPB, 1989). Fortunately the Tay Estuary has remained largely unaffected by such developments except for refuse disposal and land reclamation in Invergowrie Bay, and raw sewage discharges, particularly around Dundee (which as indicated above may be beneficial for wading birds). However there is still some uncertainty over the intentions of the City of Dundee District Council with regard to further infilling of Invergowrie Bay, which could destroy important feeding and roosting areas, and there are presently plans for a recreational development on the tip to the west of the Airfield which could also have important consequences for birds using Invergowrie Bay. Of more immediate significance are the plans to close the Invergowrie Bay sewage outfall, and to pump effluent to a new outfall to the east of the Airfield, where screened sewage will be discharged into deep fast flowing water and naturally dispersed both up and down stream. The result of this may well be a reduction in invertebrate life around the Invergowrie outfall and perhaps then a consequent decline in the number of certain wading birds using this area such as Dunlin, Redshank and possibly Bar-tailed Godwit. The BOEE counts will be continued in the meantime and will be able to monitor the fluctuations in the fortunes of the wading birds of the Inner Estuary.

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Acknowledgements

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Table 1. (a) The average maximum winter counts (November to March) in comparison to the average indices for national wintering numbers (except Golden plover and Lapwing) and (b) the average maximum autumn passage counts (September and October) for the main wader species on the Inner Tay Estuary for the seasons 1971/72 to 74/75, 1981/82 to 1984/85, and 1985/86 to 88/89 (Indices from Salmon & Moser, 1985; Salmon et al, 1989 — see text for explanation).

Season	Average Maximum Passage Count	Average Maximum Winter Count	Average National Winter Index
<i>Oystercatcher</i>			
71/72 to 74/75	132	165	118
82/83 to 84/85	560	750	116
85/86 to 88/89	675	1025	206
% change between 71/75 and 85/89	+411%	+521%	+75%
<i>Curlew</i>			
71/72 to 74/75	322	240	127
82/83 to 84/85	207	363	84
85/86 to 88/89	231	312	88
% change between 71/75 and 85/89	—28%	+30%	—31%
<i>Bar-tailed godwit</i>			
71/72 to 74/75	100	308	103
82/83 to 84/85	83	54	181
85/86 to 88/89	72	86	165
% change between 71/75 and 85/89	—28%	—72%	+60%
<i>Redshank</i>			
71/72 to 74/75	1942	1307	106
82/83 to 84/85	1100	933	73
85/86 to 88/89	1637	1180	89
% change between 71/75 and 85/89	—16%	—10%	—16%
<i>Dunlin</i>			
71/72 to 74/75	3715	2485	109
82/83 to 84/85	600	1733	67
85/86 to 88/89	1875	2625	86
% change between 71/75 and 85/89	—50%	+6%	—21%
<i>Golden plover</i>			
71/72 to 74/75	158	588	
82/83 to 84/85	250	91	
85/86 to 88/89	99	186	
% change between 71/75 and 85/89	—37%	—24%	
<i>Lapwing</i>			
71/72 to 74/75	492	588	
82/83 to 84/85	1200	690	
85/86 to 88/89	757	527	
% change between 71/75 and 85/89	+54%	—10%	

NB. There was insufficient count data available in seasons 1969/70, 70/71, and 75/76 to 80/81, and for passage counts in 1974/75.

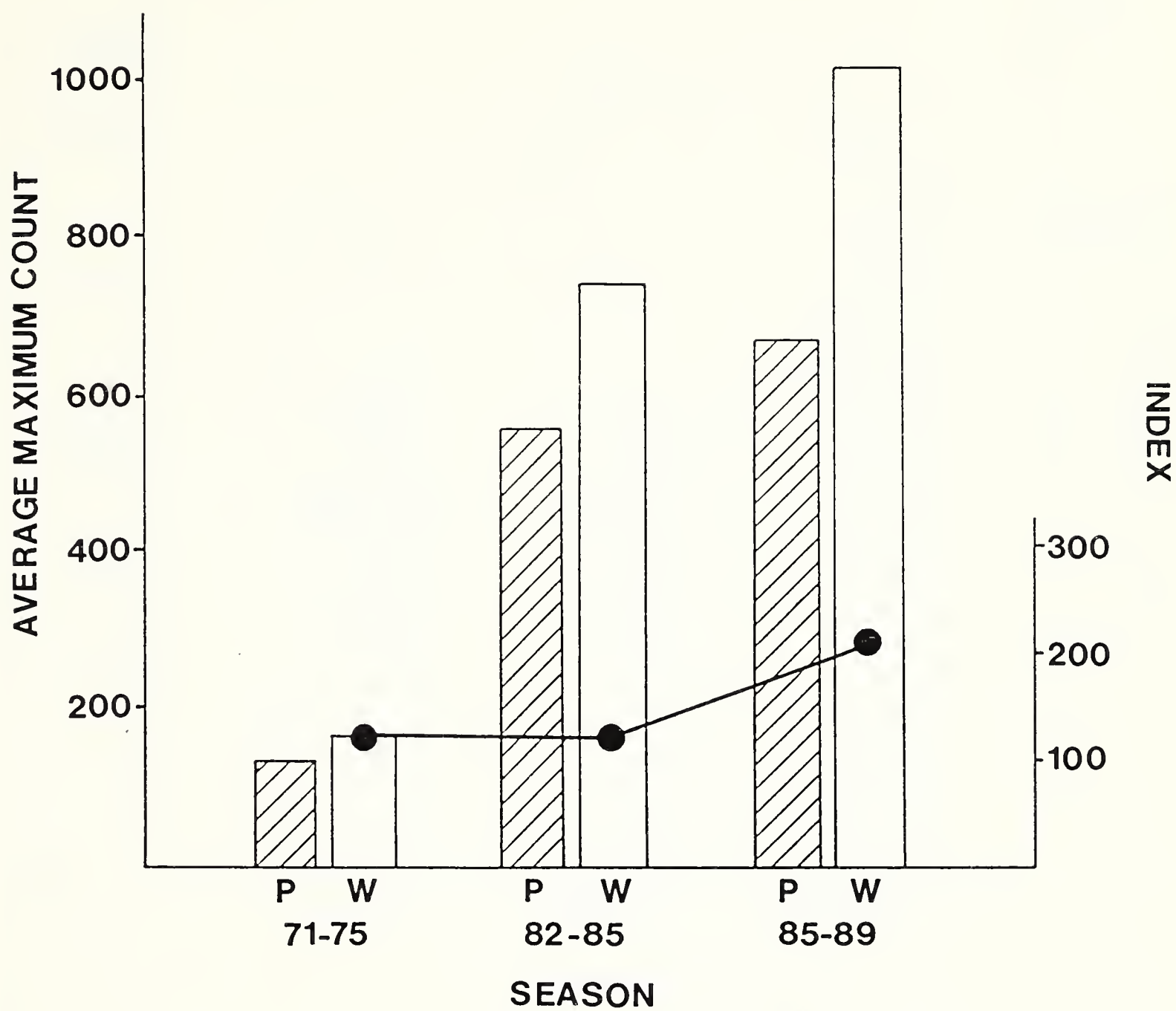
Table 2. The numbers of waders on the Inner Estuary at low water on 29 January 1989.

	Section														Total
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	
Oystercatcher		120		21	1	68									210
Ringed plover			20	1					2						23
Golden plover		44							90						134
Lapwing		375	100						51	23				30	579
Dunlin		50	2220			138	650								3058
Curlew		61	135	1	2	20			1						220
Redshank		96	297	19	4	196	30			7				57	706
Total	0	746	2772	42	7	422	680	0	144	30	0	0	0	87	4930

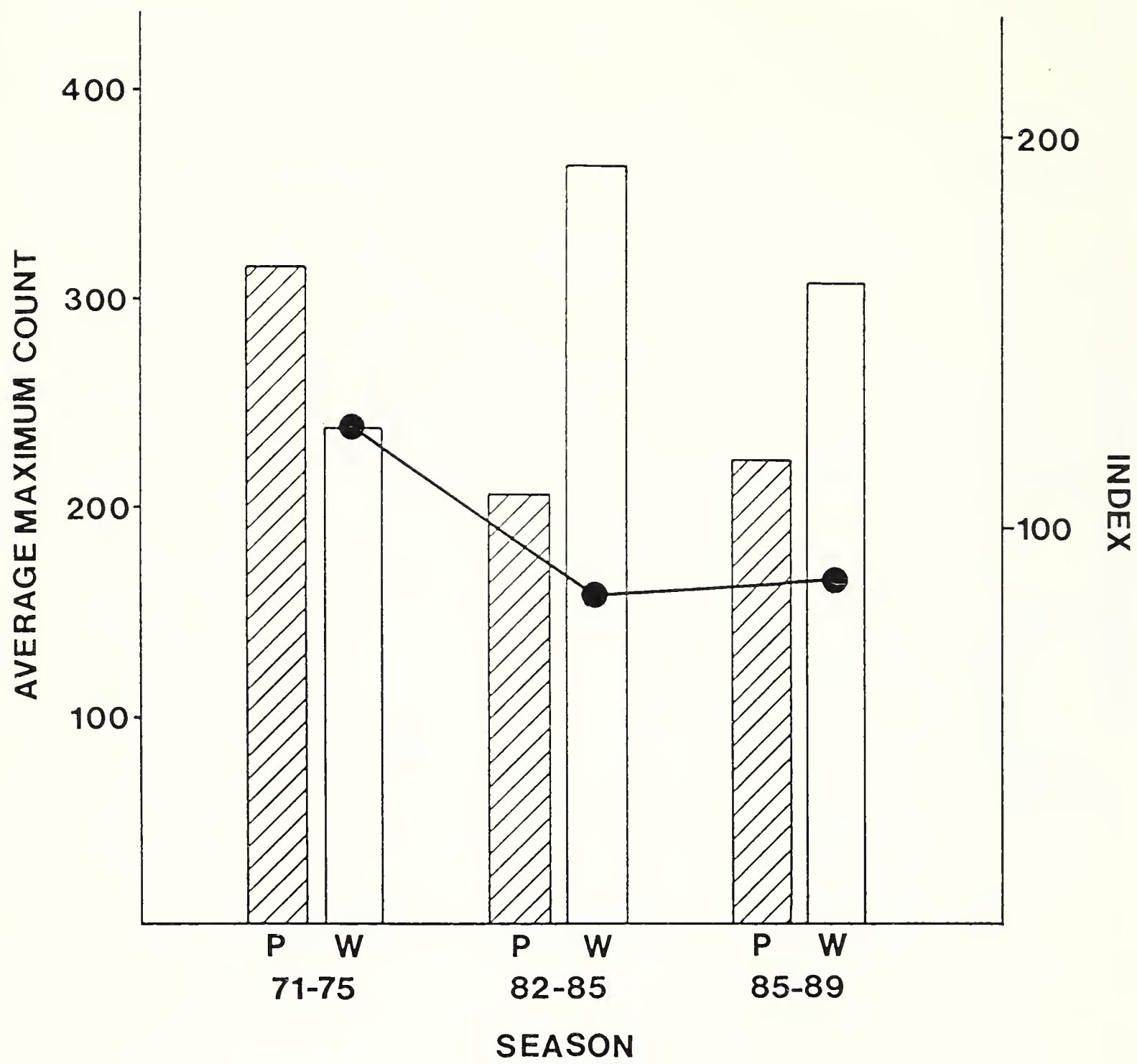
Table 3. Current 1% qualifying levels for national and international importance for wintering and passage waders (Salmon et al. 1989).

	National Passage (GB)	National Wintering (GB)	International Wintering
Oystercatcher		2 800	9 000
Curlew		910	3 500
Bar-tailed godwit		610	1 000
Redshank	1 500	750	1 500
Dunlin	2 000	4 300	14 000
Golden plover		2 000	10 000
Lapwing		10 000	20 000

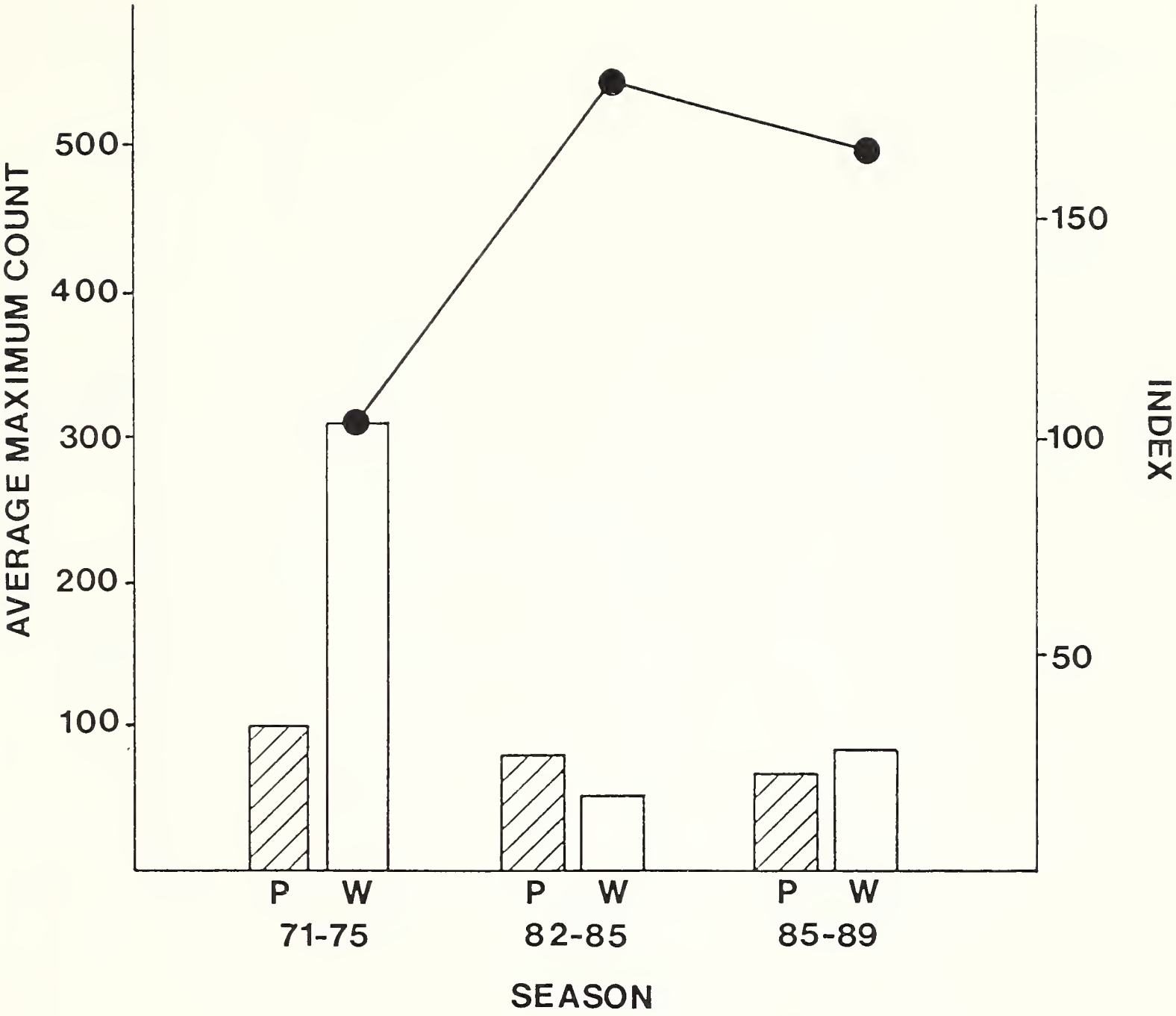
OYSTERCATCHER



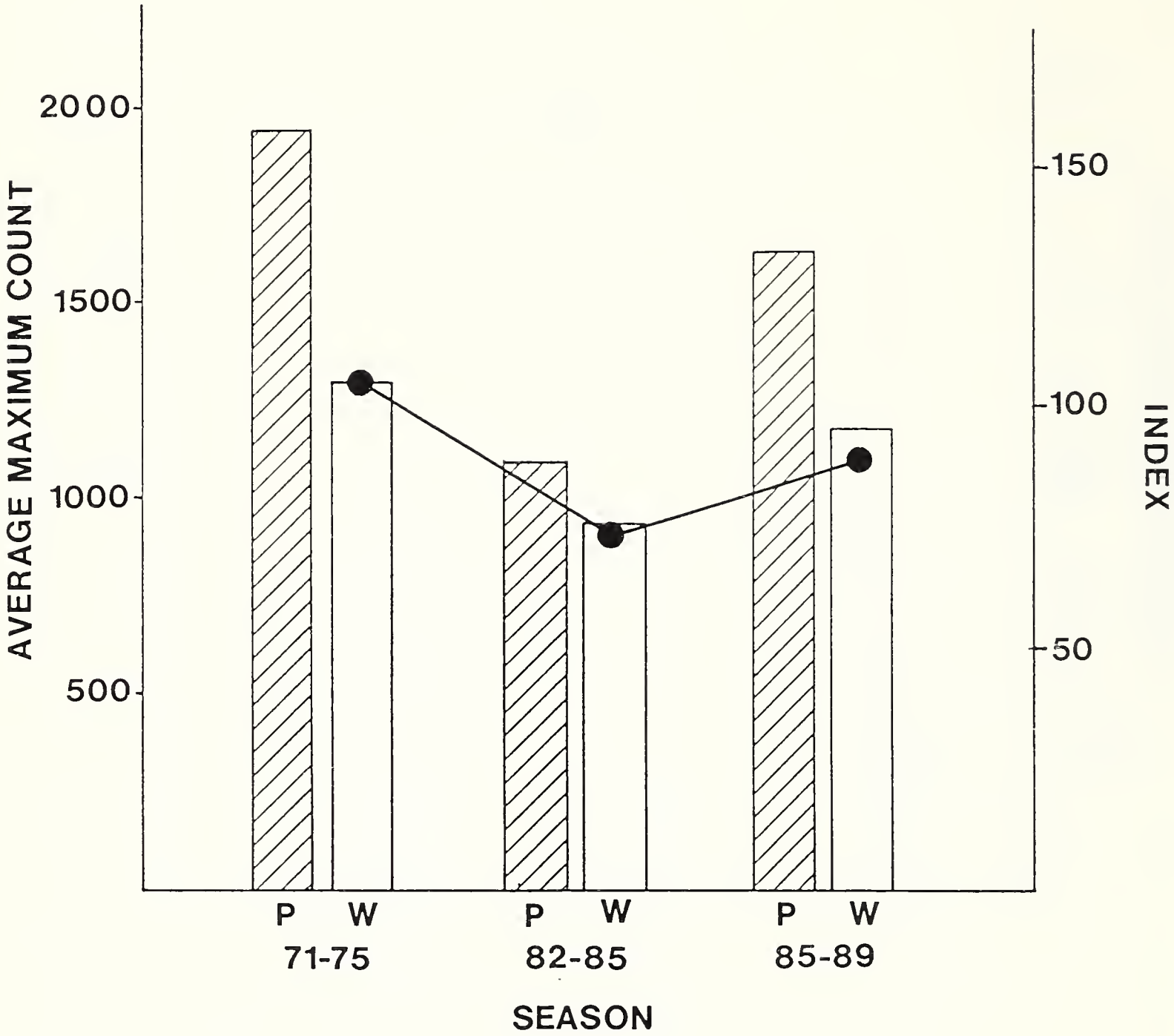
CURLEW

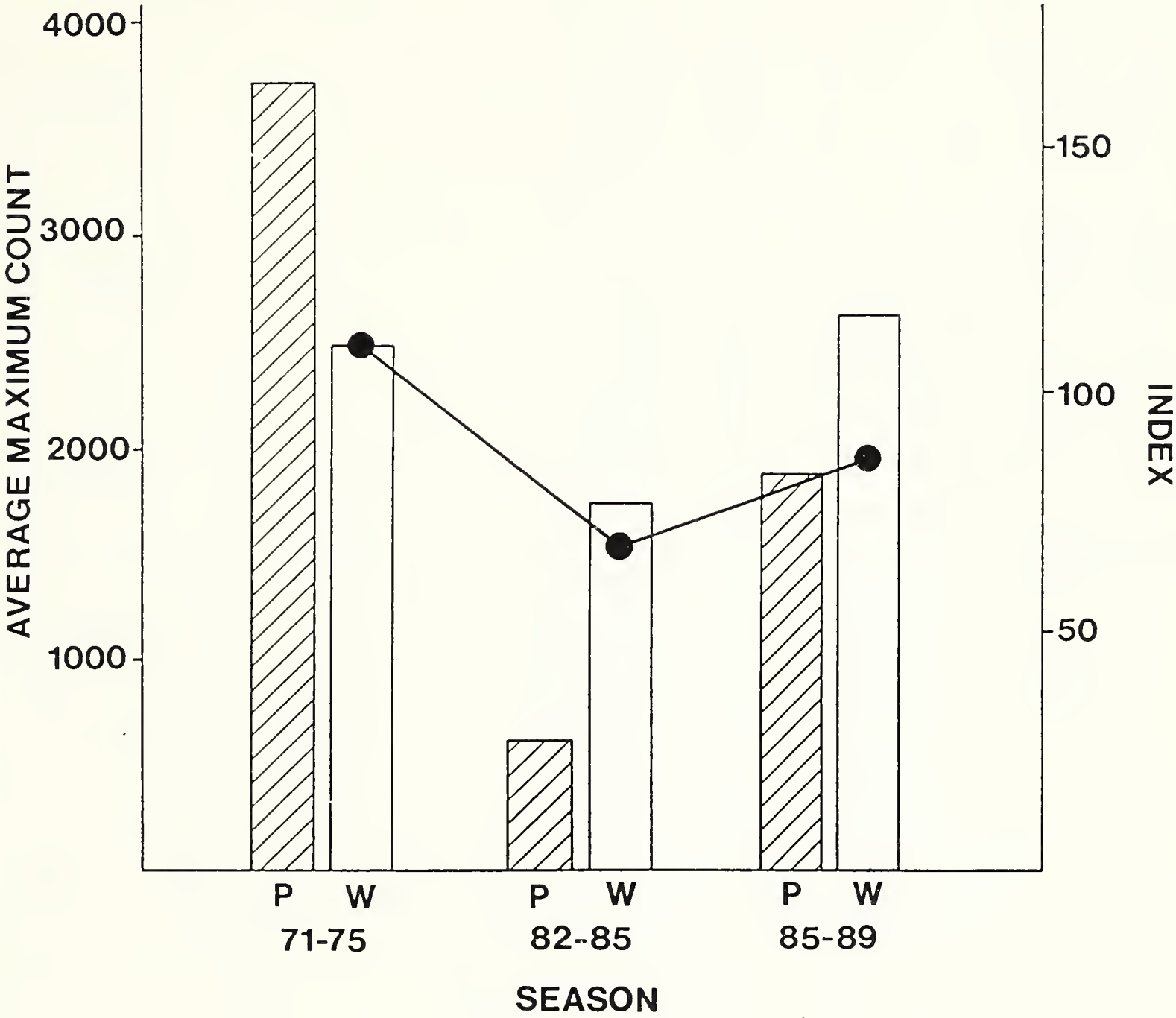


BAR-TAILED GODWIT

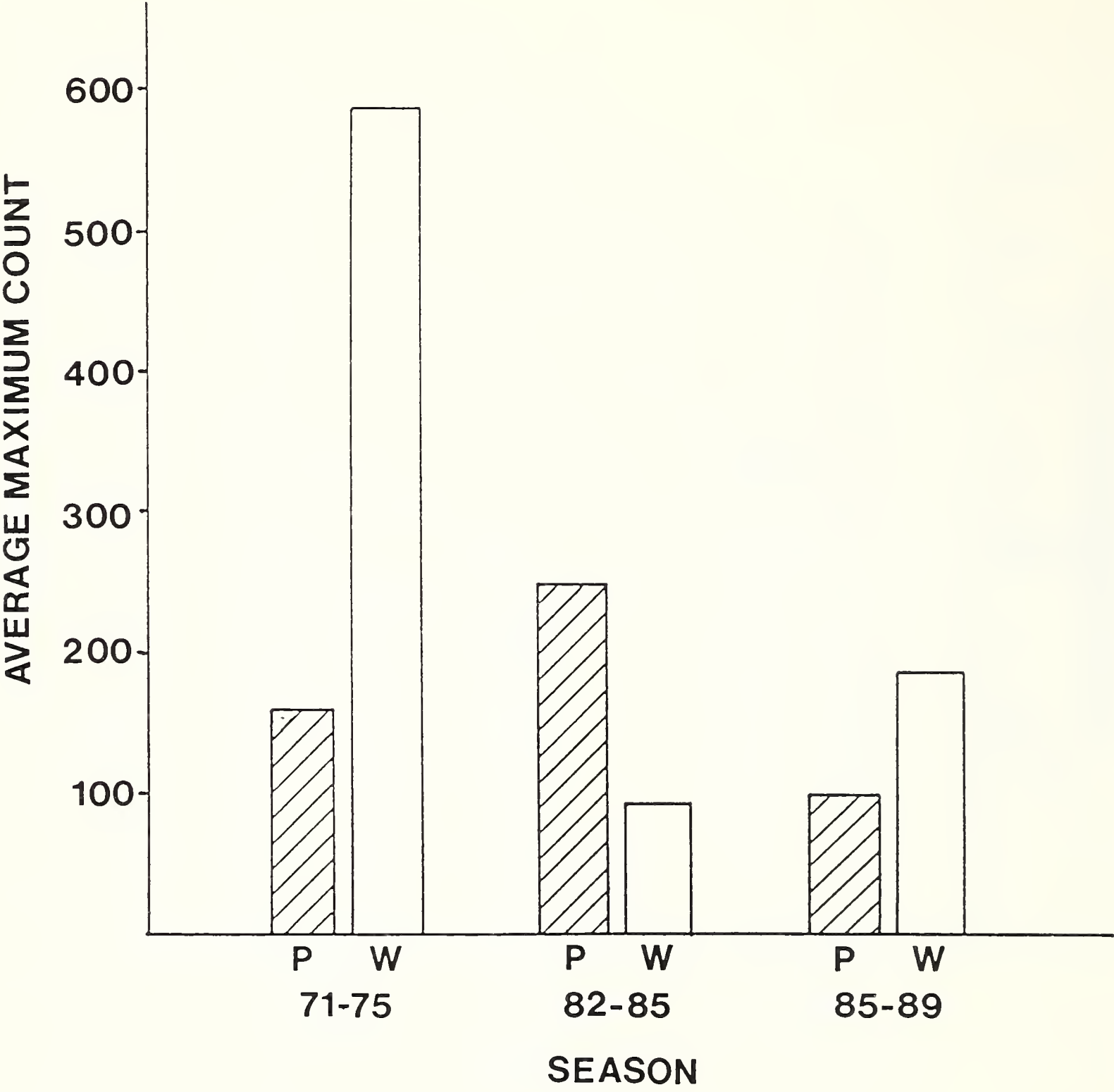


REDSHANK

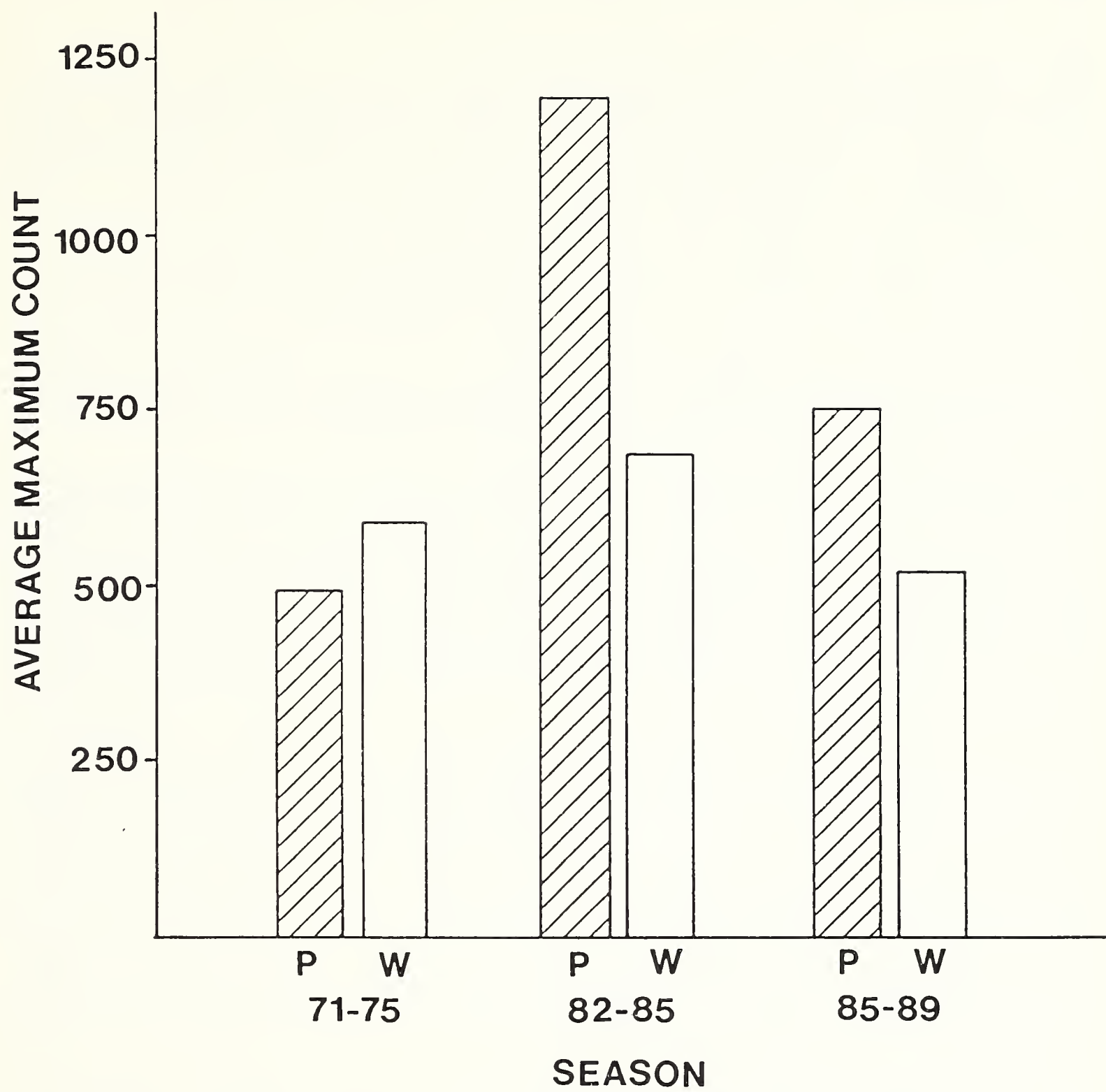




GOLDEN PLOVER



LAPWING



Pitmiddle Village and Elcho Nunnery Five Testaments

By Marion L. Stavert and David R. Perry

The publication of *Pitmiddle Village and Elcho Nunnery* in 1988 necessitated a drastic pruning of material containing many interesting facts that were unearthed during our researches. Both David Perry and myself felt very strongly that the relevant testaments that we had transcribed should be published at a later date. Where else but in the Society's journal?

Testaments are important social documents giving us a glimpse of the quality of life of those living at the time. The five testaments printed here contrast the circumstances of the testators. The prioress of Elcho was in 1570 a relic from Scotland's pre-reformation past and her testament is important as being, as far as I know, the only one of a prioress. Furthermore it tells us something of the life the displaced nuns had come to lead. The Pitmiddle testaments give us some idea of 17th century subsistence farming in the Carse of Gowrie.

A testament¹ is the appointment of an executor to administer the moveable estate of the deceased. Originally the province of the bishop's courts, the Privy Council established commissary courts in 1563 to deal with the confirmation of testaments. Each area under the jurisdiction of a commissar had originally coincided with a pre-reformation diocese with St Andrews one of the first to be subdivided. Many Perth testaments were confirmed by the commissary court of Edinburgh, a subdivision of St Andrews. The Pitmiddle testaments were all confirmed in St Andrews.

Before considering the testaments themselves it is necessary to say something about the structure and terminology of these documents. Testaments — the appointing of executors — are of two types. A testament testamentar is when the executor is appointed in writing by a testator before his decease, as with the Elcho testament, whereas a testament dative is when an executor is appointed by a decret of the commissary court, none having been nominated at the time of decease. The four Pitmiddle testaments are all examples of this. A latterwill is a formal declaration in writing as to the final disposal of one's property and the term may denote the inclusion in a single document of testament, will, legacy and inventory.

A testament had five parts with an additional one for testaments testamentar. The first part names the deceased, the farm, village or burgh where they lived, the parish, the date of death to month and year and the spouse and children if any. Relatives mentioned are usually those appointed as executors in a latterwill and finally there is the date of the will or the court decret.

Secondly there is an inventory of the moveable possessions of the deceased. This includes animal stock, crops in the field, grain in the barn, equipment, commodities, clothing and household plenishings. For most 'items' the price of

each unit is given, then the total sum of the inventory. (Unharvested oats were calculated to the third corn and barley or bere to the fourth corn.) There are no references to heritable property which is dealt with in latterwills.

Next are the debts owing to the deceased. Those listed due to the prioress demonstrate how difficult it was for any religious order to collect rents due from land in far flung parts. Fourthly are the debts owed by the deceased including rents and wages. The free gear or the net estate is then computed by deducting the debts (no. 4) from the sum of the inventory (no. 2) and debts owed (no. 3). This is then divided into three parts, the dead's part, the widow's third and the children's third. If there are no children, it is divided into two. The dead's part is disposed of in a latterwill if any. A quot is charged by the commissary court for handling and confirming a testament, usually 9d in the £ on the value of the dead's part. If there is a latterwill and legacy this will follow next. Finally there is a docquet in which the commissary confirms the testament. It is assumed that the date of confirmation is when the testament is copied into the Record of Testaments.

Editorial Principles

The testaments have had to be abridged with the texts partly in the words and spelling of the manuscript and partly in modern English. All names of persons and places are in the original spelling with dates and sums of money modernised. The inventory of moveable possessions is as transcribed but Arabic numerals have been substituted for Roman. The third and fourth parts follow a similar pattern with the last section, the commissary's docquet, compressed into one or two lines. The latterwill and legacy has unfortunately had to be abridged. Modern usage has been adopted for v,u,w, and thorn (y) has been transcribed as th and yogh (consonant y) as y. The testaments have been punctuated and capital letters modernised. Meanings of words are only given if they are not in the *Concise Scots Dictionary*.

All money is in pounds Scots, a merk is 13s 4d. In 1565 the £ Scots was worth approximately £28 (May 1990), in 1600 it was £9 and in 1620 £4.50. In 1600 £1 sterling was worth approximately £100 (May 1990).

Weights and Measures

1 peck = 1.996 gallons, 4 pecks = 1 firloft, 4 firlofts = 1 boll, 16 bolls = 1 chaldar.

Testament of Eufame Leslie, prioress of Elcho

This testament gives us important evidence as to what happened to the Cistercian nuns after the reformation in 1560. The fate of most of those in monastic orders is unrecorded, so we are fortunate to be able to learn something of the fate of the prioress and one of her nuns. We are also reasonably informed about Alexander Cok, one of the witnesses and who features in the Perth Guildry Book until his death twenty years later. It is apparent that the prioress and nuns had been forced to leave Elcho following its extensive damage by the English invaders and that she was lodging in Perth with one of the Coks, well known baxters in the burgh. It is assumed that Alexander Cok was related to this family. He was another survivor of the pre-reformation past. The prioress's debts list her rent, payments for food and also the pensions for the four surviving nuns. These should

have been paid out of the rents due for the nunnery lands, mostly in considerable arrears. One nun had married and lived until 1585, it is not known the whereabouts of the other three nuns.

The inventory gives us a good idea of what a well to do elderly lady of the lairdly class would have worn in Perth in the 1560's. Black wool kirtles, velvet and taffeta neck coverings, linen collars and underwear are all listed, also silver items and ready money. It is unfortunate that her 'Inglis Bible' only features in the latterwill, its value presumably being included in the total of utensil and domicile (household effects). In the latterwill, there is more than one mention of coal. Part of the rents paid by the laird of Wemyss were in coal from his Fife mines. After the prioress's death, the nunnery lands reverted to the crown and we can trace their subsequent redistribution by James VI in the Registers of the Great and Privy Seals. The main beneficiaries were the lairds of Wemyss, the Moncreiffes and the Erskines of Dun.

Testament testamentar of Dame Eufame Leslie 20 December 1570².

Dame Eufame Leslie, prioress of Elchok, died 7 September 1570; given by her on 31 August 1570 in presence of following witnesses, William Cok baxter, James Rynd, James Colyng burgesses of Perth, Alexander Cok maister of work and Mr George Cok vicar of Perth.

Inventory: 4 small gold ringis, 1 small silvir spune, 1 litell muskin with ane border of silvir wantand ane fute, £6 13s 4d; 1 worset gowne & 1 gowne of Scottis blak, 1 gowne of blak woll with a blak kirtell, 1 partleit of satyne & taffetie, 1 paitclaith, 8 angellis, 7 lyming collaris, 2 cornettis of velvet, 1 silken habit, 2 paris of hois, 8 sarkis, 2 furies of bevis³, £10; 1 chalder of mele, £12; in reddy money, £6; in small utensilis & domicilis, £6 13s 4d. Sum £41 6s 8d.

Debts owing to the dead by: Petir Duncane, 24 bollis beir assigned to the 4 nunnis by Dame Agnes Boswell, price of the boll, 6s 8d, £45 6s 8d, & 13 bollis ferme meill of crope 1569, 16s, £10 8s; William Cluny, 2 bollis ferme meill of crope 1569, 16s, £1 12s; The byrn⁴ few males of the Standartis besyd Dunbar in handis of Mr Edward Henry, £22; Johne Hammiltoun of Bynning for few males of Bynning, 68 merkis gross, 34 merkis due on last Assumption of Our Lady & 34 merkis on St Androis day, & due from said landis last Witsunday, £7 6s 8d; Helene Leslie⁵, hir ant, of byrn males of landis of Kynnard by Dame Agnes Boswellis pensioune & Lordis of Sessioun contributrioun, £9 6s 8d; barrone of Forgend for last Witsunday terme of landis of Cottis, £3 6s 8d; lord of Dun, fermorar of parsonage of Dun for years 1558 to 1565, £67 pa, £536; Johne Swyntoun of pultrie silvir, £2. Sum £682 13s 4d.

Sum of inventory & debts, £724.

Debts owing by dead to: Dame Helene Stewart nunn now spouse to Johne Colyne for her pensioune of Elchok, £10 & 6 bollis 6 peccis beir, £1 6s 8d, £8 10s; Dames Eufame Swyntoun, Eufame Leslie, Eufame Pait nunnis for their pensioune of Elchok, to each £10 & 6 bollis 6 peccis beir, £55; Issobell Rynd hir servand for yeris fe, £2; Agnes Fleming servand, £1; Williame Cok baxter for bread & briken mait⁶, £4 5s & for chalmer male, £2; Mr Nicol Dalgleish for fewar male, £1 6s 8d; Mr George Cok notar, for writingis etc, £2; in small items, £3; others of the 1/3s for

the $\frac{1}{3}$ of Elchok for 1560-1564, £66 13s 4d pa with which auld laird of Dun has intromittit of deweteis of parsonage of Dun extending to £333 6s 8d. Sum £417 17s 4d.

Free gear, debts deducted, £306 1s 8d; no division; quot £5 6s 8d.

Latterwill and Legacy.

Item: she appoints John Leslie brother's son of said Eufame & James Rynd burgess of Perth executors and sir Alexander Cok to assist with his counsel.

Item: to Duncane Wemyss, 6 silvir spunes & 1 silvir saltsall which she had at gud will of laird of Wemyss his father; for the necessaris of her buriall, £2; to Agnes Fleming, hir auld servand, hir blak kirtell, 2 sarkis, 2 torn challis?⁷, 2 collaris with hir hoiss, schune, slevis, 2 bollis mele & £1; to the puir maist indigent personis deokayit, 4 bollis mele, to be disponit by sir Alexander Cok; to Helen Rynd, 1 boll mele; to sir Alexander Swyntoun, 2 bollis mele & 1 chalder of coiles; to Margaret Cok relict of John Adie, 1 chalder of coiles; to Thomas Quhyttis wyf Nell, 1 boll mele; to sir Alexander Cok, 1 Inglis byble; to James Ryndis wyf, a hat & 1 chalder of coiles. The residue of hir geir to hir cousingis, John Leslie, brutheris sone, Eufame and Katie Leslie young lasses, to be equalie dividit amongis thame, all dettis being payit & the legacie fulfillit.



Road to Kinnaird and ruined cottages in foreground. *Photo: Tom Berthon.*

The testaments give us a fascinating insight into the rural economy of the former village of Pitmiddle in the Carse of Gowrie for much of the seventeenth century. They record the possessions and debts of two important rural artisans — a wright and a weaver — and of two important (at least in the village) tenant farmers, one of whom was also a money lender. They also allow some conclusions to be drawn on prices, wages and rural life in an inflationary era: the value of the pound Scots against the English pound Sterling fell from about 6 to 1 in 1565 to 12 to 1 in 1601 and the value of sterling itself more than halved between c. 1570 and c. 1620. Thereafter the values were relatively stable.

Comparison of the prices of farm animals is difficult because their value would have depended on their age and condition which are not recorded. It is also interesting that none of the tenants apparently had pigs or poultry.

Prices for grain are more easily compared. The two staple grain foods of the population were bere and oats. From the testaments it is clear that there was a considerable fall in the real price of these staples between 1598 and 1682, (1597 may have been a bad harvest). However the prices of bere with the fodder and oats were higher in 1682 than in 1674.

Wages of servants are also difficult to compare as the terms of their hire are unknown. Nor is it clear if they were farm or domestic servants. Apart from Gairdner's harvest servants, only for Robertson's servants do we know the period of their employment. The 'term's' wages owing to Benvie's servants in 1598 could have been for a year or half a year. Even if they were only due half a year's wages, the amount due to Robertson's servants in 1674 was still over 50% more in real terms. That servants were paid up to a year late, at the end of their contract, implies that they must have been provided with a daily food ration by their master.

Unfortunately household goods were not itemised and we cannot tell how their houses were furnished. Nor are the working tools of the two artisans listed: they were presumably included in the household goods as were Robertson's working tools (his ganging gear). But it is surprising that the moneylender Gairdner's household goods were the least valuable of the four testaments.

The apparent lack of cash — only Robertson is mentioned as having any — can be accounted for if money were included in household goods. But this still does not explain Gairdner's apparent lack of furnishings, even if the missing item in his inventory were cash (see below note 19). His money lending may have fulfilled a need for cash by the villagers. For them money may only have been available after their grain was sold.

The source of Gairdner's wealth is a mystery. He may have been a successful farmer — he was renting additional pasture — or he may have had business interests in Dundee or Perth. He was either unmarried or a widower at his death and his lack of furnishings may indicate he was a miser. However, assuming it was charged only once a year, the interest on his lending — 4½% to 7½% with only Elder paying 12% — compares favourably with a current (May 1990) base rate of 15%

In conclusion the testaments indicate a considerable fall in real terms in the prices of bere and oats, the staple foods of the community. Coupled with the apparent increase in servants' wages, this would represent a rise in living standards for much of the rural population. While the drop in prices would not benefit farmers unless they could increase production to compensate, some farmers could still prosper. Indeed the very fact of falling prices suggests production was increasing.

Testament dative Benvie⁸.

Androw Benvie wricht in Pitmiddill, parish of Kynnaired, died 6 February 1597⁹; Elizabeth Blair his relict, ther being na bairnis, executrix surrogat, with consent of procurator fiscal, by decret 28 February 1597.

Inventory: 2 mearis, £8, £16; 1 milk kw with hir calf, £10; 2 oxin, £10, £20; 10 yowis, £1 13s 4d, £16 13s 4d; 2 wedderis, £1 13s 4d, £3 6s 8d; 5 hoggis,¹⁰ £1 4s, £6; in the barn and barnyard, 2 firlottis quheit, £4; 2 bollis beir, £8, £16; 2 bollis aittis, £6, £12; in utensill and domicill with his abulyement, £20. Sum of inventory, £124.

No debts owing to the dead.

Debts owing by the dead to: Patrik Ogilvy of Inchemartyne maister of the grund for ferme of land occupeit be him, crope 1597, 2 bollis meill, £6, £12; 2 bollis beir, £8, £16; 6 caponis, 13s 4d, £4; 12 pultrie, 8s, £4 16s; James Anderson servand, fie and bountay of term preceding Benvie's decease, £3; Elspet Brydie, servand woman, fee and bountay of said term, £1 10s. Sum £41 6s.

Free gear, debts deducted, £82 14s; divided in 2 parts, £41 7s; quot £2 1s 4d.

Testament dative Millar.¹¹

John Millar brabonar in Pitmidle, parish of Kynnaired, died October 1622; by Marie Bowak his relict, in name of Andro, Jon, Elspet and Margaret Millaris, lawful bairns of said John Millar and minors, executors dative by decret of commissar of St Andrews 23 November 1622.

Inventory: sawin on the ground, 2 firlottis 2 peckis aittis estimat to 3d curne, extending to 6 firlottis 6 peckis aittis, £4 13s 4d the boll, £11 1s 8d¹²; 2 firlottis 2 peckis beir estimat to fourth curne, extending to 2 bollis 2 firlottis beir, £5, £12 10s; utenceill etc, £20. Sum £43 11s 8d.

Debts owing to dead by: Henrie Millar in Pitmiddle, £23; Jon Bowack there, £20; Andro Muir there, £20; Patrik Will there, £14 13s 4d; Robert Millar in Craigaillie,¹³ £6 13s 4d; Patrik Ogilve in Pitmidle, £6 13s 4d; James Nicoll there, £4; Patrik Justice there, £5; Andro Syme in Myresyd,¹⁴ £3. Sum £103.

Sum of inventory and debts, £146 11s 8d.

Ordinary debts owing by dead to: laird of Inchmairtene maister of the grund, silver dewtie £18; for kaine fowll,¹⁵ £6 13s 4d. Sum £24 13s 4d.

Free gear, debts deducted, £121 18s 4d; divided in 3 parts, £40 12s 8d; quot £2 6s paid to commissar 23 November 1622 at time of his tak.

Testament dative Robertsone.¹⁶

Patrik Robertsone in Pitmidle, parish of Kinard, died March 1674; by Eupham Lawson his relict, executrix surrogat by decret of commissar 2? October 1674.

Inventory: in the yaird, ane stak of bear, 6 bollis, price of boll with fodder, ¹⁷ £5 6s 8d, £32; 6 bollis eatis, £4 10s, £27; 4 oxin, £12, £48; 1 kow, £10; 2 hors, £12, £24; 6 scheip, £1, £6; reddy money in the hous, £8 14s; utincill, ganging gear etc, £13 6s 8d. Sum £169 8d.

No debts owing to dead.

Debts owing by dead to: Jon Small servand man, 1 yeiris fie and bountie, £20; William Peadie servant boy, 1 yeiris fie and bountie, £8; Margaret Jak servant woman, 1 yeiris fie and bountie, £10. Sum £38.

Free gear, debts deducted, £131 8d; divided in 2 parts, £65 10s 4d; quot £3 5s.

Testament Gairdner.¹⁸

Thomas Gairdner in Pitmidle, parish of Kinnard, died February 1682, by Andro Wightoun in Abyrnyt, husband to Helen Mar, sister dochter to said Thomas, executor dative by decreet of commissar of St Andrews 3 March 1682.

Inventory: 1 hors, £6 13s 4d; 1 kow, £8; 1 quoy and 1 stott, £8; 8 sheip, £1 3s, £9 4s; standing in the barn and barn yaird, 15 bollis oatis, price of boll with fodder, £6 13s 4d, £100; 14 bollis bear, price of boll with fodder, £6 13s 4d, £93 6s 8d; 1 boll peis, £6 13s 4d; utincillis etc, £6 13s 4d. Sum, £245 4s.¹⁹

Debts owing to dead by: Jon Gelitlie in Inchstur, £33 6s 8d principall and £2 10s of annual rent; George Wardroper in Abernyt by 2 bands of premonition, £66 13s 4d and £3 of annual rent; Gilbert Blair, £40; James Bairnard in Inchstur by band, £33 6s 8d and £2 of annual rent; Thomas Elder in Balgarno, £20 by band and £2 8s of annual rent; airis and executoris of umquhile Alexander Blair, £66 13s 4d and 1 yearis annual rent, £4; George Patullo in Hors Inch,²⁰ £66 13s 4d and annual rent £4; Jon Gall in Balbigie, £66 13s 4d principall and £4 of annual rent. Sum, £415 4s 8d.

Inventory and debts, £660 8s 8d.

Debts owing by dead to: Mr Francis Montgumrie of ferm crop 1681 money rent, £83; 6 firlottis bear, £6; 6 firlottis eatis estimat to £7 10s; James Small schoolmaster, 13s 4d; James Gairnes, of fie, £8; James Jackson of fie and bountay, £12; Peter Jackson for harvest fie, £7; Christian McLachan of fie, £6 13s 4d; Alison Swan of harvest fie, £4; Thomas Jack of grass meall, ane boll eatis, £5 6s 8d²¹; John Hood of dry multar,²² £5. Sum, £145 3s 4d.

Free gear, debts deducted, £515 5s 4d; no division; quot, £25 15s.

Notes

1. This account is based on Robert S. Barclay, *Orkney Testaments and Inventories 1573-1615*, Edinburgh 1977. For further details of the background, personnel and places mentioned in the testaments see *Pitmiddle Village and Elcho Nunnery*, Perth 1988.
2. Scottish Record Office, Register of Testaments, Commissariat of Edinburgh, CC8/8/2.
3. Beaver furs.
4. ie byrunnis, overdue.
5. Daughter of Robert Leslie of Innerpeffary, a half niece of Eufame. She married 1. John Barron, a prominent Edinburgh protestant and friend of John Knox, died 1569 and 2. John Kirkaldy. She was murdered during the siege of Edinburgh, see Michael Lynch, *Edinburgh and the Reformation*, Edinburgh 1981, p. 338.

6. Provision of food.
7. Possibly bed covering, a blanket. See *Oxford English Dictionary*.
8. SRO, Register of Testaments, Commissariat of St Andrews, CC20/4/3.
9. ie 1598.
10. Probably hoggets or yearling sheep not yet sheared.
11. CC20/4/8.
12. The calculation of this sum is wrong: if the boll was £4 13s 4d then the total should have been £8 15s; if the total of £11 1s 8d was correct, the price of the boll should have been £5 18s 2²/₃.
13. Possibly Craigdallie where the mill stood.
14. A former site of a farm, shown on Stobie's map of Perthshire 1783.
15. See PV & EN p 17.
16. CC20/4/13.
17. ie the barley had not been threshed separating the grain from the straw or animal fodder.
18. CC20/4/14.
19. The total as listed is £238 10s 8d. The clerk copying the testament into the register has omitted an item worth £6 13s 4d.
20. An unknown place name.
21. The price of this boll of oats differs from that owed to the laird.
22. Hood was the miller.

British Schools Exploring Society

Yukon '90 Expedition Report July 16-August 29 1990

Angus Sandeman

The British Schools Exploring Society was founded in 1932 by the late Surgeon Commander G. Murray Levick, a member of Scott's Antarctic expedition of 1910. Over 400 people applied for each of the summer expeditions with only seventy or so people finally being selected for each. Selection was by application form submitted in November 1989 followed by an interview in December. The expedition briefing was held in Hathersage near Sheffield in April 1990. We split up into our science groups and began to form a picture of what we would be facing in the Yukon — it turned out not to be as we expected . . .

THE JOURNEY

After six months hard fund raising I was finally ready to tackle the wilderness of the Yukon in Northern Canada. Even when I left on the overnight train from Dundee, it had not sunk in that I was at last starting the "adventure of a lifetime".

The next morning my colleague from Aberdeen and I eagerly jumped on the tube, only to arrive at Heathrow to find that we were the only expeditioners there. After a while Richard Wade, the only Irish expeditioner, arrived. Soon there was a group of 40 oddly clad, massive rucksack wielding youngsters, along with a few "older" members. After the "weigh-in" at the check-in desk everybody wondered just how they were going to carry all that weight in their sacks! And then, after several hours waiting and renewing acquaintances we were off, with 9½ hours of flying to look forward to. The food was good, which is more than can be said for the wine! (and the film).

On touchdown at Vancouver Airport, 40 tired, hungry and very scruffy people got off the Air Canada aircraft and went to find their rucksacks, still wondering why it was still daylight at this time of the night. As the rucksacks were hauled wearily off the conveyor belts, I waited and waited and waited for mine. Eventually, after several hours of worried waiting, I was informed that it had gone to Calgary! It was going to be on the same flight as us to Whitehorse said the customs officer, he thought! To my relief at Whitehorse, the sack trundled round the luggage carousel and into my arms.

We spent the night on the gym floor in the Jéckell Junior High School. After a 'local style' breakfast of jam doughnuts we set off for another four hours travel, this time in 4 x 4 Dodge Minibuses.

On the way we saw a rare bald eagle and stopped to watch it soar away and around us. When we reached base camp, four miles down a dirt-track from the Alaska Highway, we were welcomed by Geoff Billington, the Chief Leader, and the other

40 or so explorers who had arrived the day before us. An advance party of leaders had set up the food store and its electric fence the week before, and our tents had been pitched by group 1. We split into our science groups or “Fires” as they are known and constructed shelters under which to cook. As it turned out we never needed them due to the fact it was about 35°C for the first two weeks! Very hot indeed and many suffered from sunburn and even sunstroke.

THE SCIENCE PHASE

After several reconnaissance walks up Boutellier Creek, we decided on our campsite. After establishing a food dump, where tinned foods could be dropped by pickup truck we moved into our science camp. As it turned out Geomorphology were the furthest away from Base Camp (but the nearest to the food dump) and we also had the best campsite, the main feature being a fresh water spring. All water had to be boiled at the other camps — many did not and many suffered.

There were six science camps in all—

Four in Silver Creek — Life Science 1 and 2. Geology, and Tephrochronology (part of Geomorphology) and
two in Telluride Creek — Surveys and Geomorphology.

The Science Phase lasted three weeks but that included numerous day walks, and also two days Adventure Training to prepare us for the Adventure Phase itself.

We were situated at the confluence of the Telluride River, (which flowed from the Telluride Glacier, about two miles above us) and a small stream which flowed down from the ridge, which we used for washing. We sited our food store across the stream, at an old miners camp. We also cooked away from the tents, and no food was allowed in or near them, due to the risk from bears. We were in a grizzly bear’s territory, and she had a cub which made her potentially dangerous.

We had two leaders at our camp—

Phil Robbins, who studied hydrology, and Nicola Johnson who studied lichenometry.

We split the group in two and my group studied lichenometry for the first week. This involved hiking up to the moraines every morning and measuring the diameter of lichens growing on moraine boulders. This allowed us to “date” the various areas of moraine, and hence discover the glacier’s surges and retreats. Nearer the end of the science phase we tried our hand at surveying and mapped the glacier and its moraine deposits.

After a hard day’s ridge walking we moved on to hydrology with Phil Robbins. This proved to be an “interesting” project as it involved standing in a freezing cold river for five minutes at a time, every three hours between 9.00 a.m. and 9.00 p.m. We were measuring the daily variation in flow, caused by glacial melting between noon and 3.00 p.m., the hottest hours of the day. We made a profile of the river bed, and then took the depth of the deepest point every three hours. After doing this we measured the velocity of the river and found the flow rate. We did the same with the tributary stream, and found there was very little daily variation. This showed it was fed by run-off and not melt water. The small amount of variation was caused by snow-banks in the ridge gullies melting between noon and 3.00 p.m.

It was during hydrology that Phil and my tent mates went to see the bears which had been spotted numerous times at Life Science 2. We only got a mile before I spotted them 25 yards away heading for the Survey and our campsite. We watched the bears for about five hours but they did no damage and soon returned to Silver Creek.

It would soon be time for the Adventure Training and meanwhile we continued our science work. I also dealt with keeping some of the meteorology readings — rainfall and the maximum and minimum temperatures. We had three rainfall gauges up the valley and two thermometers — one at camp and one on the moraines. Checking these was also a daily task.

We also did soil profile studies at various sites, again to see how the moraine had been shifted, and what had affected it — erosion by rivers, streams etc. thousands of years ago. This was very interesting as we were able to determine the old course of the river and stream and made a very interesting project indeed, even if only a time-filler. It involved digging three feet deep holes and identifying the various soil layers — moraine, peat, clay, etc.

WILDLIFE

During the Science Phase I was lucky enough to be the only person to see a wolverine. These are ferocious little beasts, like a cross between a fox and a collie, and can keep a grizzly bear at bay — no mean feat! Birds of prey were abundant, including several golden eagles, which could often be seen above the ridge. There was a large population of ptarmigan, and they were often around the campsite with their chicks. Another campsite local was the Arctic Ground Squirrel — cheeky little devils who would risk all for food!

One was even seen to steal an entire Pilot biscuit (about 4" across) and run off with it between its ever hungry jaws. They were scavengers and thieves, stealing not only from our cooking area, but also from our food store. Any food which had been nibbled had to be discarded due to the risk of contamination. Several families of marmots — large alpine guinea pig type animals, also lived on the ridge near Life Science 1. They emitted a high pitched whistle and I once got to within 10 feet of a mother marmot by whistling back at her and slowly moving towards her, camera in hand!

THE ADVENTURE PHASE — THE TREK

After the Science Phase everyone regrouped at Base Camp to prepare themselves for the 10 day Adventure Phase. After several late night "Pancake Parties" around the camp fire we were all totally unprepared for a 3.00 a.m. departure. Life Science 1 and 2 and Geology were heading for Bryson Creek, past our science camp for three days mountaineering, while Geomorphology 1 and 2 and Survey had split up and gone their separate ways for five days trekking and exploring. We (Geomorph 1) headed down Telluride Creek towards Mt Decoeli, where the Telluride joined the Jarvis River. We did six river crossings that day, and another five the next. Only two people have ever died on BSES expeditions and both were doing river crossings at the time. Although only knee deep, there was tremendous force in the river. It was very cold and impossible to see the river bed due to the mud from the glacier.

After camping at the Jarvis which had beautiful clear water, (a chance for a much needed bath!), we carried on over the Alaska Highway and on to Kloo Lake. Here we witnessed the Aurora Borealis — the spectacular Northern Lights, but slightly further north than Aberdeen! We had to boil all our water for five minutes because of “Beaver Fever” and luckily no-one caught it. We did all our cooking on open fires to save fuel which had dramatically risen in price due to the Iraq affair, of which we knew very little. Crossing back over the Highway we entered Sulphur Creek and camped that evening on the shores of Beaver Lake. We planned to return to the original Geomorphology camp for our last night after picking up five more Army issue 24-hour Arctic Ration Packs — all dehydrated meals and very nutritious. Unfortunately when we arrived the bear and cub had taken up residence so we moved on, up towards Bryson Creek for the mountaineering. We camped about half way there, at a source of fresh water. After a long lie in — 2.00 p.m.! — the next day we continued on to Bryson. We had been getting up at 5.00 a.m. every morning to avoid the heat of the sun, but usually ended up walking until at least 3.00 p.m. and going to bed about midnight. We were a very tired, but fit group of youngsters! We had averaged about 12 miles each day — quite hard work with full packs and little water.

THE MOUNTAINEERING

When we arrived at Bryson Camp we were told that we would be getting up at 5.30 a.m. — a lie in for us! It rained on the first day, and we did not leave the camp till the afternoon. We spent several hours on the glacier and then returned for a welcome hot meal. We cooked in tent outer flysheets to shield the stoves and keep us slightly drier (well, the cooks were anyway!). These were situated well away from the sleeping tents as there was still a bear risk.

For the second day, we headed up to a different glacier — there were five in close proximity — to do some technical work. It was a beautiful day with blue skies and very little cloud. Once we reached the glacier we roped up in groups of six and practised ice-axe arrests — if somebody falls into a crevasse everyone drops to the ground and lies on top of their ice-axes. One of the leaders then tried to pull us along the ice and in most cases succeeded!! This was quite a painful exercise but showed us just how hard it was to get it right on solid ice — it is relatively easy on snow!! After that we crossed some ominous 100 feet deep crevasses.

When we reached the vertical ice we split into two groups — one for abseiling and one for prussiking. This is the skill of climbing up a rope using thinner cord wrapped round it. This could be slid up the rope and would lock when you put your weight on it. Using this method we hauled ourselves out of a crevasse; it was hard work but in an emergency it could be your only chance of survival. This is assuming that the people on the other end of the rope got their ice-axe arrest right and are not sliding into the crevasse with you! Although it was the first time I had prussiked I had abseiled many a time and thoroughly enjoyed myself. We all had a go at climbing out of a crevasse and this proved good fun for all, especially those with cameras. The group trudged back to camp after a thoroughly enjoyable day on the ice.

When we woke to the sound of gales on the day of the ridge walk, we knew immediately it would be cancelled. There was snow lying at the camp but it soon

disappeared when it reverted to rain after an hour or two. A narrow ridge is not a safe place to be in high winds, low cloud and rain. It was decided that we would take all the climbing kit down to the food dump to lessen the last day's workload.

It poured with rain all day and we were all thoroughly drenched when we got back. Many of us were very disappointed at not getting a crack at the Cairns Ridge and even more so when the next day was a beautiful one. This was our fifth day of the mountaineering phase — three days mountaineering and two days to walk in and out to the camp — a bit of a con really! When we reached the food dump I got out of my winter climbing gear and into summer trekking gear — from fleecy salopettes, Goretex jacket and plastic boots to shorts, Helly Hanson top and light-weight walking boots.

PACKING UP!

I yomped the six miles back to Base Camp on my own. This was the last “real” day of the expedition — from now on it was clearing up and partying all the time! I literally threw my rucksack and boots off and fell into the cool water of the camp bath. It was great! After an hour the rest of the group returned and we set up the tents and got some tea on. I knew I was going to miss the Cairn range immensely — it felt like home to me. After 10 days the pots and pans were going to take a lot of work to clean. We were now very nearly out of fuel, so again cooked on open fires. Our meals were now steaks, bacon, sausages, eggs, not to mention lots of custard and pancakes. I was Geomorph's pancake king (as I had a non-stick pan) but my efforts at custard were not quite up to scratch — warm yellow milk was as close as I got to becoming the Custard King!! it was very hard work cleaning up the camp — there was a great deal to do — washing up, cleaning stoves meticulously, taking down store tents, numerous litter sweep searches, packing science equipment and generally trying to remove all signs of our being there.

The first travel group left for Whitehorse after a barbecue and disco in our food store — a log cabin with one of our tarpaulins for a roof. The next day my travel group dined continuously on custard — there were 15 large tins left over from the expedition! After a final blitz of the entire campsite we all retired to bed in the foodstore, as our tents were already packed up and drying out in Whitehorse.

The next morning we packed up the tarpaulin and our rucksacks into the van and walked the four miles out to the Alaska Highway.

Five of us stayed on till the end — two leaders and two of my Geomorph colleagues. We were quite sad to go and saw no need to rush — until we heard that there were five more people than there were seats! We knew the leaders would get seats anyway, so we raced off — we had a lot of catching up to do! We made it easily. But then, of course, I took a picture of everyone boarding the bus and lost my place in the queue. We stopped at Haines Junction and saw an award winning slide presentation about the Yukon. I wish mine was as spectacular. It used nine projectors, so I suppose it had a slight advantage over me!

We spent the rest of the Sunday in Whitehorse after meeting the first travel group. Many of us dined in the ludicrously cheap Mr Mikes “Eat until you explode” Salad Bar. The offer had to be taken up, and for only £2, it was!!

That night Group 1 left at 3.00 a.m. and it was a sad time for all. It is hard living with a group of people for six weeks and then overnight half of them disappear. We spent another day in Whitehorse and then we ourselves left the Yukon. I knew then that I might never return there, although I would try my hardest — it is a land of hidden gold, big bears and heavy rucksacks!

After a fun filled day in Vancouver where we travelled by limousine, sky train, sea bus, coach and yellow cab, we left Vancouver on the long 9½ hour flight home. I slept for almost the entire trip as did many others. When we landed at Heathrow, we collected our baggage, which had thankfully arrived, and then sadly said our goodbyes. Mark Brambles from Perth had slept at Heathrow the night before and we cheerfully boarded our train and sped home to Perth, reminiscing about both good and bad times on the expedition.

Without your generous assistance and words of encouragement this “trip of a lifetime” would not have been possible.

THE FLOODS IN PERTSHIRE, FEBRUARY 1990

R. Allcock, Director, Tay River Purification Board

On 4th February a warm front crossed Scotland bringing a rapid rise in temperature coupled with very strong winds and driving rain. This weather followed a very wet January (figure 1) with rainfall totals well above average and a period of heavy continuous rainfall over the first three days of February in the highland districts of Perthshire. Much of this heavy rainfall fell as snow at higher levels and the rapid thaw that came with the warm front was to contribute to the excess run-off a few days later. The table below gives an indication of the rainfall levels at some of the Board's rain gauges that preceded the flooding on 4th and 5th February.

STATION	JANUARY Total (mm)	% Average	FEBRUARY (mm)					
			1	2	3	4	5	Total
Lochay Power Stn. (Killin)	400	225	46	38	31	32	27	175
Dall (Rannoch School)	257	241	39	18	45	29	18	150
Lochearnhead	416	211	35	19	28	50	15	148
Perth	136	—	4	5	8	4	2	24
Mylnefield (Dundee)	99	167	2	1	1	3	2	11

Figure 2. shows the three hourly rainfall at Lochay Power Stn. from 1st-5th February.

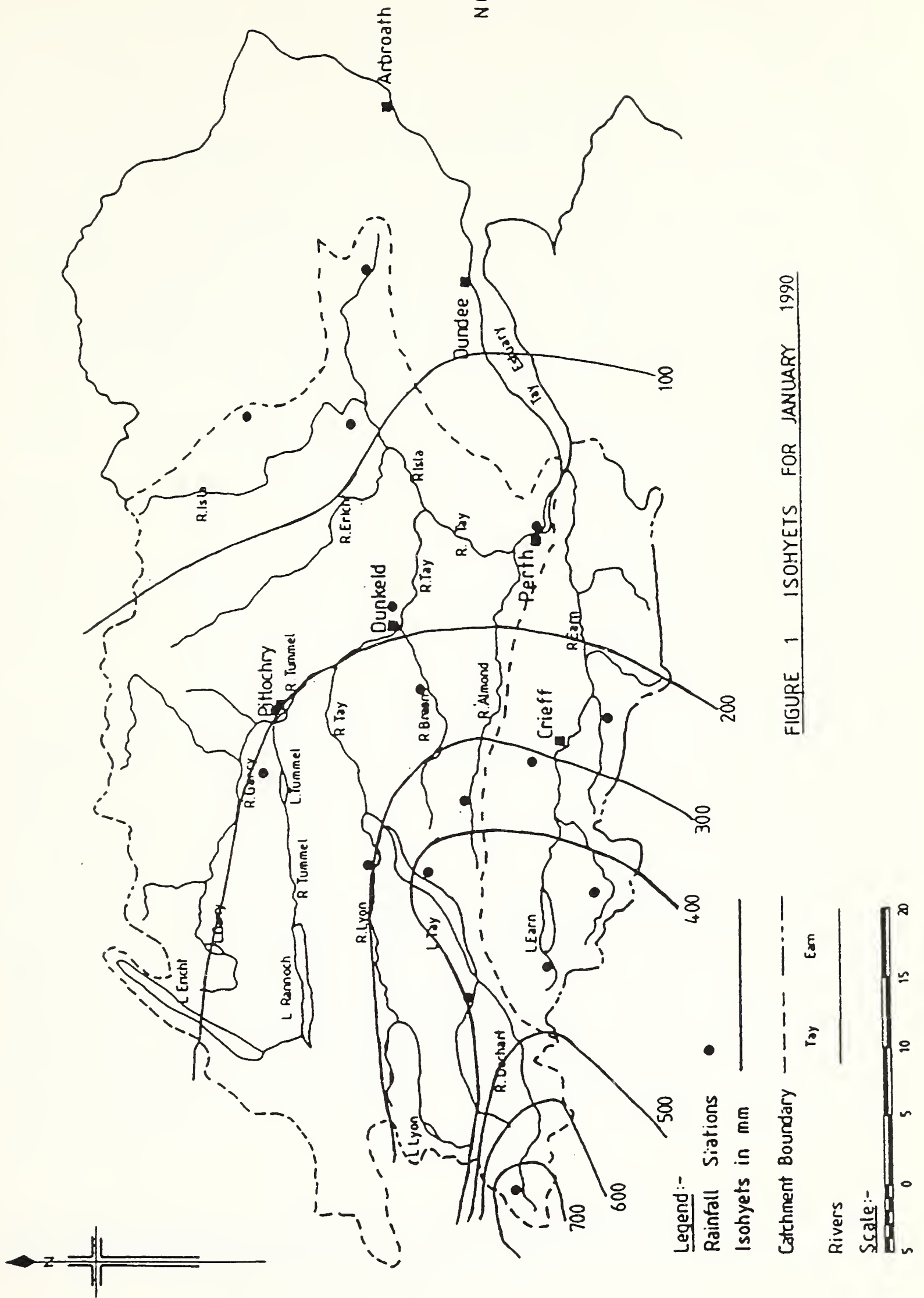
The intense rainfall, melting snow and ground saturated from weeks of precipitation produced a massive run-off of water from the catchments of the Central and Southern Highlands into loch and river systems which were already well above normal levels.

On 3rd February the River Tay at Ballathie was flowing at 585 cumecs and the River Earn at Kinkell Bridge at 80 cumecs. These flows represent almost three times the February average.

As the warm front passed over Scotland on 4th February the heavy rain and melting snow caused many of the tributaries in the Tay, Tummel and Earn valley to rise rapidly in the early hours. Many of these, such as the Braan, Almond and Ruchill passed their peak flow by midday but the main rivers continued rising throughout Sunday and into Monday 5th February.

On the River Tummel the largest flow ever to pass through the Pitlochry Dam reached its peak of 970 cumecs at 1.30 a.m. on 5th. The Hydro-Board have reported that some 75% of this flow originated in the River Garry catchment outwith their control.

On the River Tay at Pitnacree Gauging Station (Grandtully) the peak flow of 669 cumecs was reached at 3 a.m. Below the confluence at Logierait an immense volume of water, probably well in excess of 1500 cumecs, combined to pour down the Tay valley reaching a peak flow of 1747 cumecs at Caputh Gauging Station at 7.15 a.m. on Monday morning.



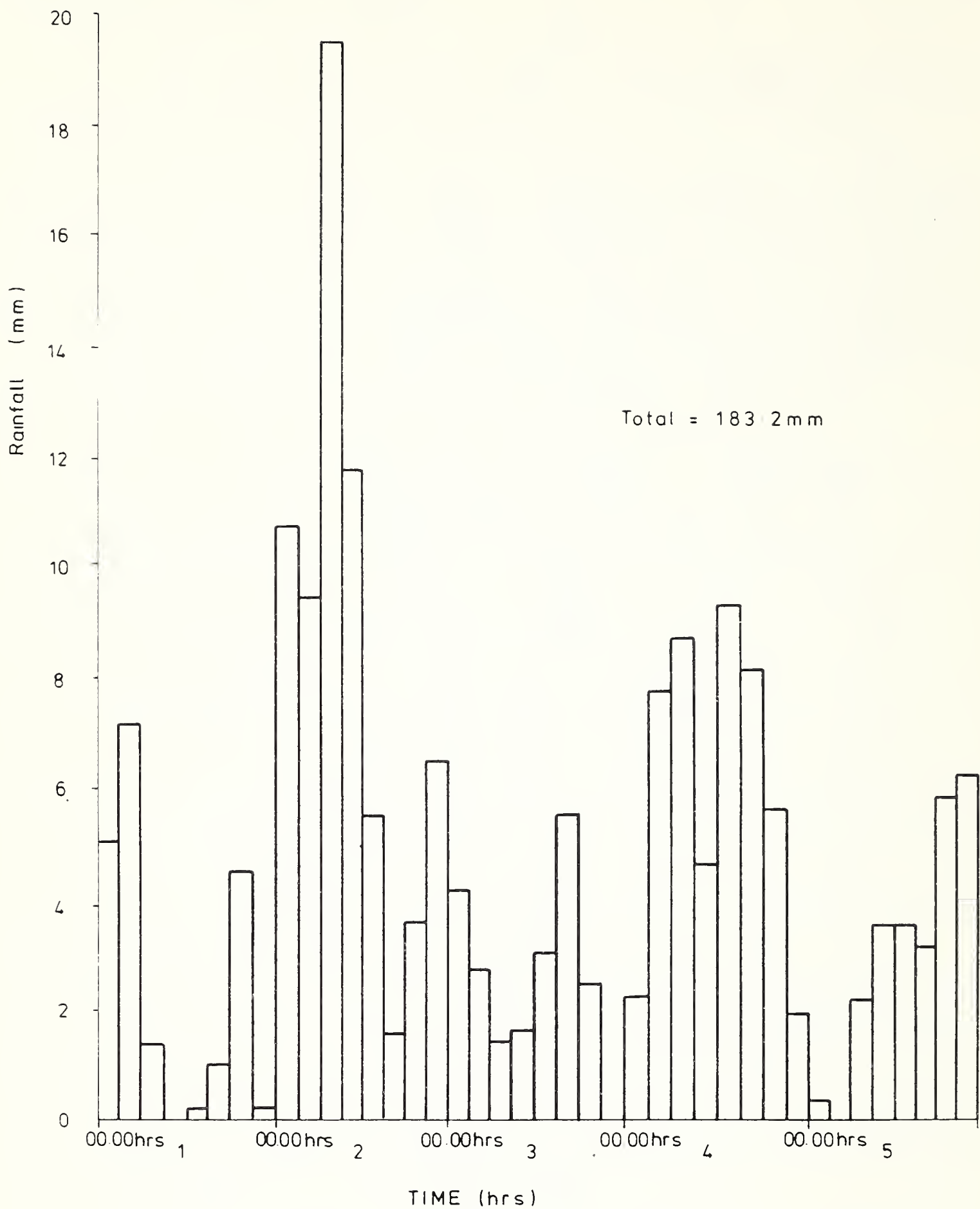


FIGURE 2 - RECORD OF THREE HOURLY RAINFALL FIGURES AT LOCHAY POWER STATION
1 - 5 FEBRUARY 1990.

Below Caputh, major breaches in the floodbanks had occurred sometime before the peak flow reached this stretch of the river, possibly about 3 a.m. A large area of land in the vicinity of Spittalfield, Meikleour and Kercock was inundated, the effect of which was to delay and reduce the flood peak downstream of Kinclaven.

The peak discharge of 1750 cumecs at Ballathie Gauging Station did not occur until 14.45 p.m. on Monday afternoon, 7.5 hours after it had passed through Caputh 10 km upstream. This was the greatest flow recorded at Ballathie since the station was constructed in 1953.

At Perth the flood did not peak until about 16.30 p.m. between the high tides. The levels reached at Smeaton’s Bridge were measured at 17 cms below those of the mark for the flood of February 17th, 1950.

Throughout the Upper Tay system and down to Ballathie this flood surpassed any previously recorded in gauging station records.

The following table gives information to this and previous floods at selected gauging stations in the Tay and Earn catchments.

STATION	RIVER	RECORDS FROM	1990 (Cumecs)	PERIOD (Years)	PREVIOUS PEAK (Cumecs)
Comrie Bridge	Lyon	1973	380	50	310 (1989)
Kenmore	Tay	1975	380	35	288 (1979)
Pitnacree	Tay	1958	669	50	557 (1974)
Port-na-Craig	Tummel	1973	970	35	750 (1983)
Caputh	Tay	1951	1747	65	1339 (1951)
Ballathie	Tay	1953	1750	23	1570 (1974)
Kinkell Br.	Earn	1952	273	10-15	255 (1971)

Figure 3 shows the hydrograph for the River Tay and tributaries from 2nd to 7th February. One of the features of the recent event was the length of time for which high flows were maintained. At Ballathie Gauging Station the mean daily discharge has exceeded 1000 cumecs for four consecutive days from 4th to 7th February.

Areas Inundated

The Tay Valley

A total of 34 km² of land throughout the catchment, especially the upper and middle reaches of the Tay, were inundated during the flooding.

The main areas affected include land from the confluence of the Rivers Tay and Lyon to Weem and Aberfeldy. Flooding also occurred around the confluence of the Rivers Tummel and Tay and down to Dunkeld. At the confluence of these rivers the village of Logierait suffered severe inundation. The village of Dalguise was isolated following a breach in the floodbanks north of the Dalguise viaduct and the nearby railway line was also severely damaged.

Just downstream of Caputh, the river breached the flood banks causing extensive inundation of agricultural land over an area of around 11 km², isolating the village of Spittalfield.

The Earn Valley

Areas of land within the Earn Valley also suffered inundation but to a lesser extent. St. Fillans was cut off for a time and Crieff caravan park was inundated. Inundation of land adjacent to the River Earn occurred from Aberuthven down to

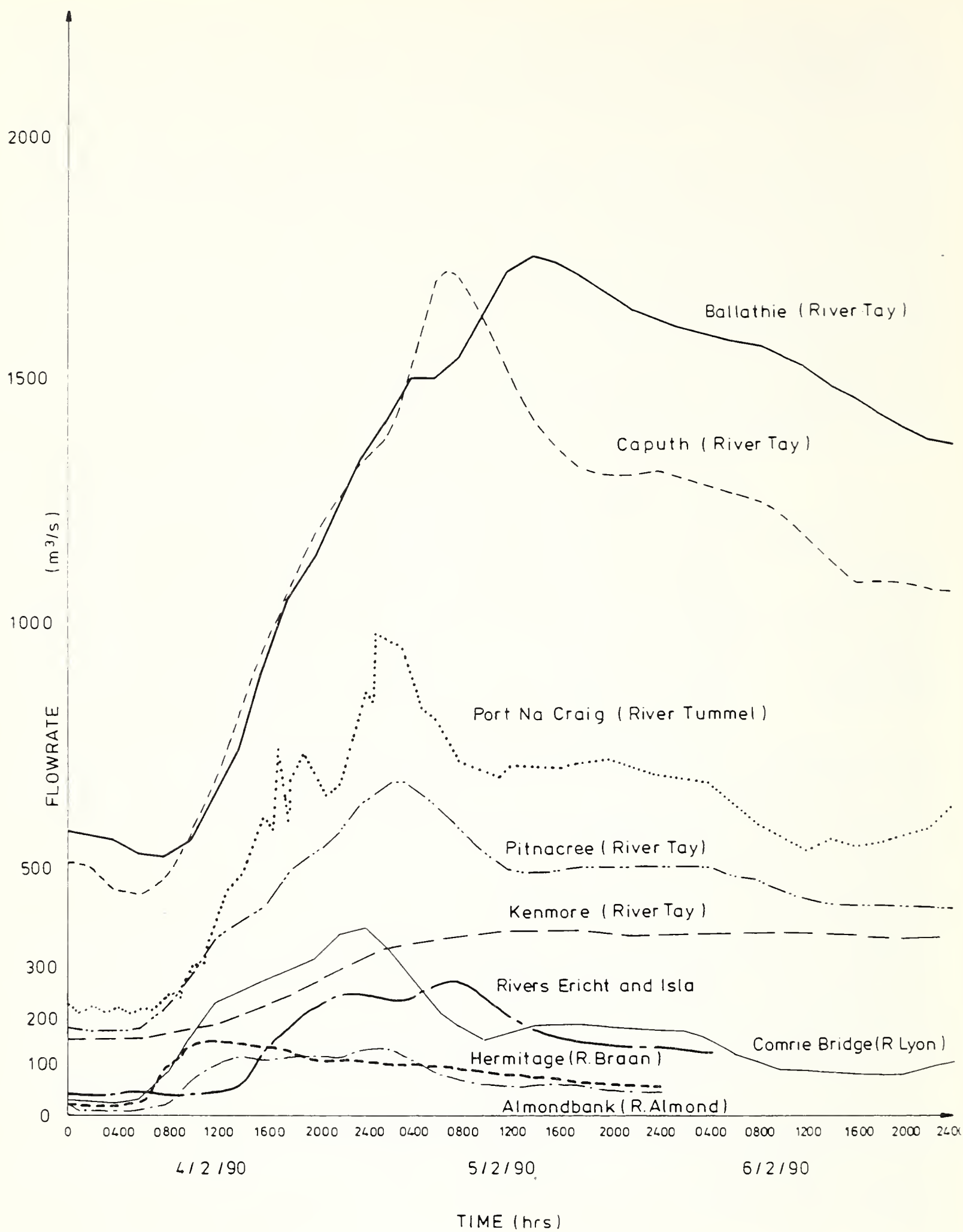
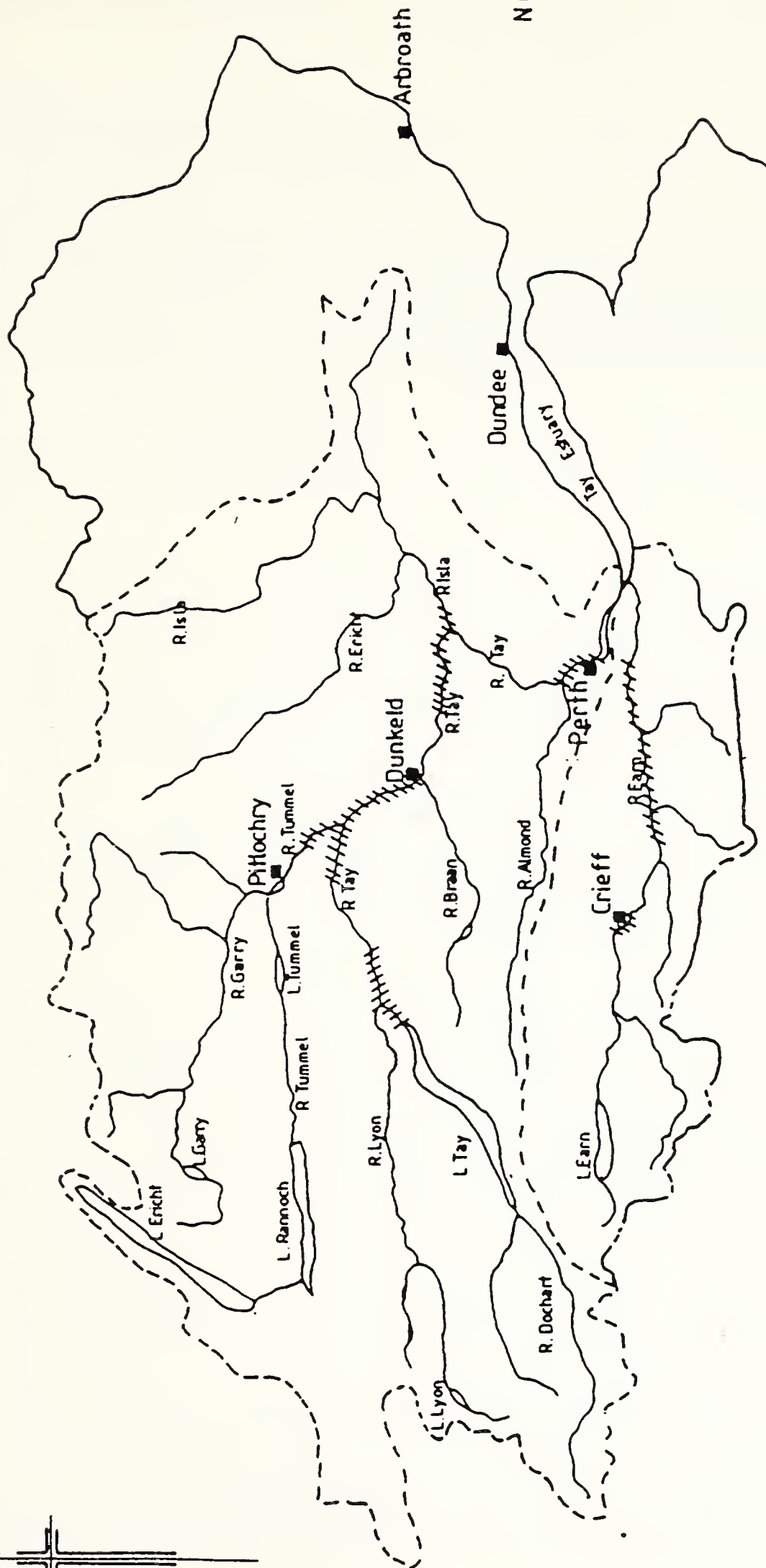
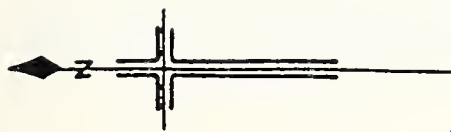


FIGURE 3 - COMPARISON OF FLOOD HYDROGRAPHS ON THE TAY CATCHMENT
4th 5th - 6th FEBRUARY 1990



Legend :-

Area significantly affected by Flooding Feb.1990 //

Catchment Boundary - - - - -

Tay

Earn

Rivers

Scale:-



FIGURE 4 RIVER TAY AND EARN CATCHMENTS

Bridge of Earn and some serious damage was sustained by houses in Bridge of Earn. In total 8 km² of land was inundated.

Perth

In Perth both the North and South Inches and Moncrieff Island were inundated directly from the river. A number of buildings, including Upper Springlands, Bell's Sports Centre and the basements of buildings in Charlotte Street and Barossa Terrace, were also affected. Other areas included North Muirton, were close to being flooded. Elsewhere in Perth flooding resulted from the backing up of sewers and the lade under George Street and also from ground water intrusion. Ten roads were closed in Perth city at the peak of the flood. The unusually heavy spate on the River Tay also caused flooding of the Perth Harbour quays. Shipping movements had to be suspended and were not resumed until Friday 9th February.

Extent of Damage

Extensive damage occurred as a result of the flooding in February. The following sections summarise the types of damage sustained to agricultural land, buildings and to other property.

Agricultural Damage

Agricultural land throughout the Tay and Earn Valleys suffered considerable inundation and damage.

In general, the damage suffered along the upland tributaries and reaches of the River Tay was much less serious than that to agricultural land along the lower and middle reaches. Damage was caused by the failure and overtopping of floodbanks and resulted in scouring, loss of topsoil, crops and stock, damage to fences, roads and communications, deposition of sediment and debris.

Long term damage, such as damage to soil structure, leaching of nutrients and fertilisers and transport of weeds and parasites may also have resulted from the flooding. The source of inundation to agricultural land was not only direct flooding, but also via neighbouring land.

Building Damage

Many buildings throughout the catchment suffered damage as a result of the flooding. Some houses had considerable depths of water throughout resulting in extensive damage. In some cases occupants had to be evacuated.

At Bridge of Earn, Dalguise, Dunkeld and Logierait a number of houses were seriously flooded. New holiday chalets at Logierait were extensively flooded while at Dunkeld, new bungalows were inundated to a depth of around one metre, necessitating the replacement of virtually all fittings within. At least two caravan parks were also inundated.

Extensive damage to buildings was caused by flooding in Perth. Almost every basement in the area abounded by Marshall Place and South Methven Street suffered inundation resulting from the backing up of sewers, groundwater infiltration and, in some cases, direct inundation. Those most seriously affected included Upper Springlands, Bells Sports Centre, residences in Barossa Place, Rose Terrace, George Street and Marshall Place. Where stock and/or living quarters were located at basement level extensive damage was sustained, especially where the owners could not move items to higher levels. Some houses required replacement of electrical wiring, floorboards, kitchen fittings, floor coverings and furniture.

Damage to Public Property

Public property and the property of various authorities was damaged by the flooding. In addition, services were disrupted and other indirect losses were incurred.

The Perth to Inverness and Perth to Dundee railway lines were both closed for a period of time due to the flooding. The Perth to Inverness line was closed for nearly two weeks after the floodbanks were breached at Dalguise and the line severely damaged.

Many roads throughout the catchment were affected by the flooding, a large number being closed at some time. The A9 was closed twice when silt and debris covered the road. Many rural roads were also closed and ten streets were closed in Perth city centre. In Glen Lyon a 20 metre length of road was washed away and St. Fillans was at one time closed due to the rise in the level of Loch Earn. Caputh bridge was also closed to vehicles and pedestrians.

HISTORICAL BACKGROUND

General

Historical records have shown that flooding in the Tay Catchment has occurred frequently in the past. Newspaper articles give detailed descriptions of the flooding and areas which suffered inundation for certain events in the 1900's. A list of flood events has been compiled and a summary is included in Table 3.

The earliest record of inundation of Perth dates back to 1210. This flooding was said to have been caused by heavy rains coupled with a spring tide and resulted in 'half the town being swept away'.

Flooding of the catchment has generally been caused and/or exacerbated by a combination of factors including continuous rainfalls, high tides, snowmelt and strong winds. On a number of occasions the River Tay at Perth was frozen over; during the thaw the river became choked by ice and flooding resulted.

Flood levels of varying degrees of reliability are available, some of which are marked on a tree near the Dalguise viaduct.

Study of the previous floods on the catchment has indicated that in addition to Perth certain areas have been affected regularly in the past, including Dunkeld, Dalguise, Aberfeldy, Pitlochry and Meikleour.

Evidence from newspaper articles and other sources indicates that Perth has periodically suffered inundation. The North and South Inches, Marshall Place, Barossa Place, Rose Terrace, Commercial Street and Moncrieffe Island have historically been regularly affected. There is less information on the specific causes of the flooding in Perth although they would appear to be generally similar to the 1990 flooding: backing up of the sewers, the burns and the lade and perhaps groundwater intrusion and some direct inundation.

The largest known flood ever recorded in Perth was on 17th February 1814, when the level at Smeaton's Bridge reached 7.0m Above Ordnance Datum Newlyn (AOD) (compared to 5.84m AOD in February 1990). This flooding caused extensive inundation of Perth extending westwards past what is today South Methven Street.

From the available records it appears that flooding of streets and basements in the main flood prone areas occurs when river levels reach about 5.6m AOD. Over the last 100 years observations suggest that this level has been exceeded on at least ten occasions.

Table 3

LIST OF FLOOD LEVELS AT SMEATON'S BRIDGE, PERTH

YEAR	DATE	LEVEL (m) A.O.D.	WEATHER CONDITIONS
1814	February 12th	7.0	River choked by ice
1847	October 7th	6.11	Excessive rainfall and SE winds
1950	February 7th	6.03	Heavy rain, high winds, snow melt.
1951	November 5th	5.97	Heavy rain
1868	February 1st	5.90	—
1990	February 5th	5.84	Heavy rain throughout January, snow melt
1853	January 20th	5.79	—
1928	January 22nd	5.77	Wettest January on record
1962	February 12th	5.73	—
1912	December 21st	5.68	Heavy rain, snow melt, high tides
1913	May 9th	5.66	—
1851	January 19th	5.65	—
1903	January 31st	5.64	Heavy rain, strong gales and snow melt
1894	February 7th	5.64	Continuous rain
1910	August 29th	5.61	—
1947	January 17th	5.55	—
1909	January 18th	5.52	—
1931	June 15th	5.49	—
1974	January 31st	5.29	Heavy rain during January, snow melt
1989	February 7th	5.07	—
1210	—	Not known	Heavy rain, spring tide
1621	October 14th	Not known	—
1773	February	Not known	River choked by ice
1872	February 7th	Not known	Two days of constant rain, strong easterly winds, snow melt

Acknowledgement

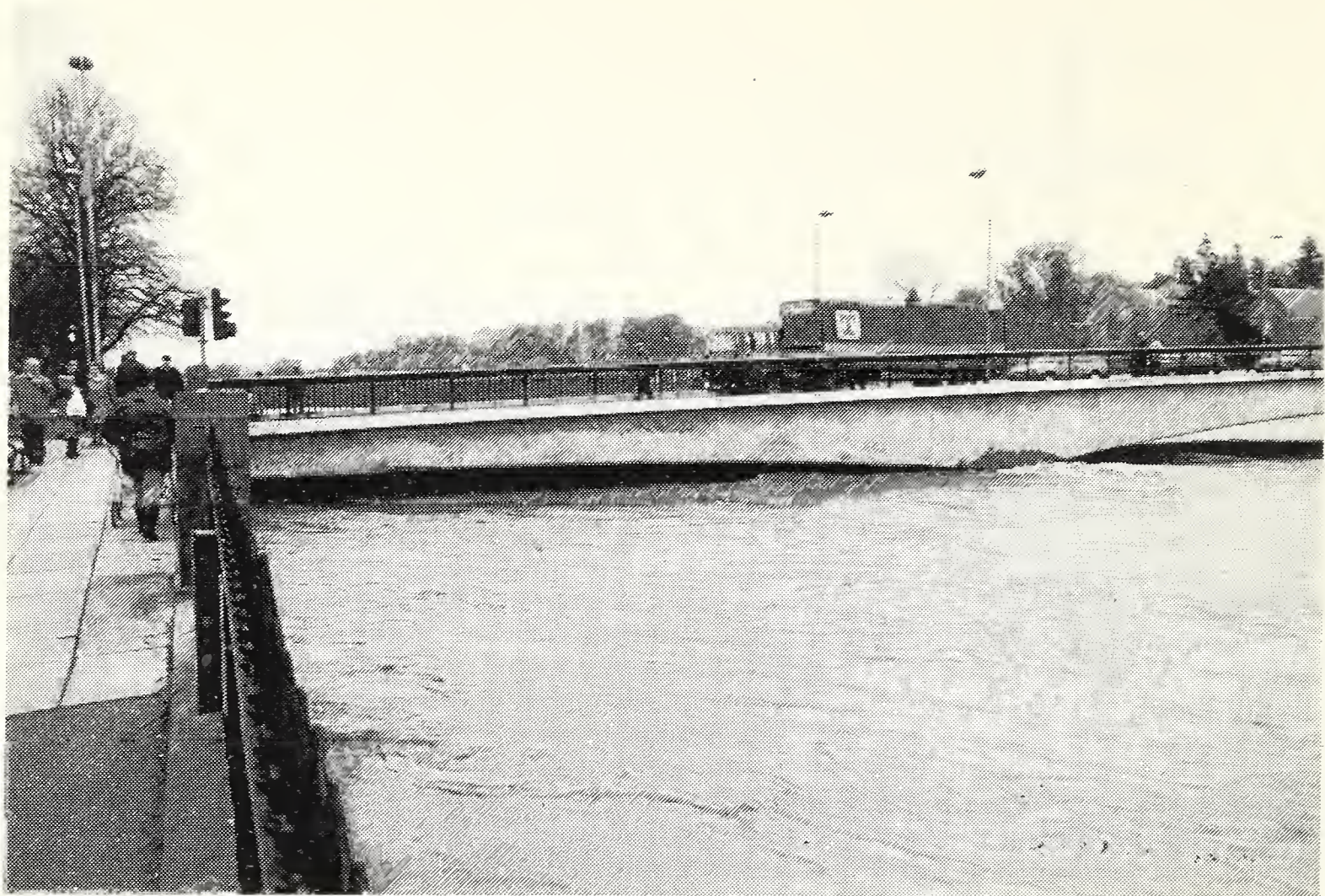
I would like to record my thanks to Babbie Shaw and Morton for information drawn from the Report on Flooding in the River Tay Catchment, October 1990.



Railway Bridge, Tay Street, February 1990.



Rose Terrace, February 1990.



The Queen's Bridge, February 1990.



Council workers at the back of Bell's Sports Centre, February 1990.

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